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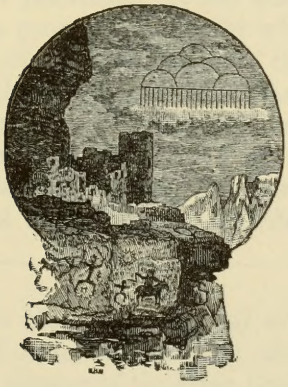
BUREAU OF AMERICAN ETHNOLOGY
BULLETIN 198

Inter-Agency Archeological Salvage Program

RIVER BASIN SURVEYS PAPERS

ROBERT L. STEPHENSON, *Editor*

No. 39—AN INTERPRETATION OF MANDAN CULTURE HISTORY
by W. RAYMOND WOOD



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The River Basin Surveys Papers, of which this is the 10th bulletin, are issued under the scientific editorship of Robert L. Stephenson, acting director of the River Basin Surveys.

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PUBLISHER'S NOTE

A separate edition is published of each paper in the series entitled "River Basin Surveys Papers." Available copies of Papers 1–39 can be had upon request to the Publications Office, Smithsonian Institution, Washington, D.C. 20560.

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No. 38. Archeological investigations in the Toronto Reservoir area, Kansas, by James H. Howard. Bull. 189, pp. 319–370, pls. 51–58, figs. 59–66. 1964.

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PREFACE

The hamlet of Huff is some 18 miles southeast of the city of Mandan, N. Dak., on the west bank of the Missouri River. About one-half of a mile southeast of Huff, adjoining the Missouri River bank, is a large, fortified Indian village site which bears the name of the town (map 1). Of the village sites along the course of the Missouri River within the present State of North Dakota, the Huff Site (32MO11) has perhaps been the focus of as much comment and speculation as any of the others, largely because of its size and its distinctive fortification system. Archeological interest in this site has grown since the partial publication of the results of Thad. C. Hecker's fieldwork there in 1938–39. Hecker excavated one long-rectangular house at Huff and tested several others (Will and Hecker, 1944, pp. 19–23, 60–61, 94–96, passim).

The Huff Site will be subject to wave action from the impounded waters of the Oahe Reservoir when that body of water is at full pool. For this reason, salvage work at the site was initiated in 1959. At that time, the State Historical Society of North Dakota and the University of North Dakota, assisted by funds from the National Park Service, sent a field party to the site. The 1959 field party, under the direction of Dr. James H. Howard, of the University of North Dakota, excavated two long-rectangular houses and two of the corner bastions of the fortification system. A summary account of this work has been published (Howard, 1962 b). Further work seemed desirable, however, and during the summer of 1960 a second salvage field party spent 10 weeks at Huff, under my direction while I was then at the University of Oregon. This fieldwork was underwritten by the State Historical Society of North Dakota and by the National Park Service. During this last season the fortification ditch and palisade were further explored and eight additional houses were dug. Since no further work is anticipated at Huff, the investigations of Thad. C. Hecker and of James H. Howard have been incorporated into this study. Maps published by these two excavators have been redrawn for the sake of consistency.

The excavations of 1960 were implemented by the interest and cooperation of many people. The late Paul Beaubien, regional archeologist, Region II, National Park Service, and Dr. Robert L. Stephenson, then chief, Missouri Basin Project, are responsible for the 1960 excavations having been undertaken. Russell Reid, superintendent, State Historical Society of North Dakota, saw that the field party was fully equipped and prepared to go into the field. Norman Paulson, museum aide, supervised the cataloging of specimens

so closely and efficiently that this task was completed shortly after the close of the field season. His assistance in many other respects has been invaluable, not only during the time the site was being excavated but in innumerable instances since then. I am also grateful to Dr. James H. Howard, University of South Dakota, for his advice during a visit to the site, and for the loan of his site maps, redrawn in this study.

The able and hard-working crew included Neil Kirschner as assistant archeologist. There were six field assistants: John Berg, Walter H. Birkby, Lawrence W. Hanson, Jon Muller, Gordon F. Robinson, and Stephen W. Robinson. During the last few weeks of work at the site, when a multitude of problems and adverse weather arose, it was the sustained interest and labor of these men which brought the season to a successful close.

Mr. Robert P. White, caretaker, Fort Abraham Lincoln State Park, was in large part responsible for the amount of work completed in 1960. His help in removing overburden from three of the houses materially shortened the excavation time, and his constant aid made life in camp more enjoyable—one might say endurable. The North Dakota National Guard also assisted in the work at Huff. Capt. James P. Grimstad took the very fine aerial photograph of the site which was used as the base for the site map, and Sgt. Peter Wang, Jr., capably handled the National Guard road patrol which was employed late in the season to strip overburden from a number of the houses. Robert P. White also operated the road patrol when other duties prevented Wang from being at the site.

Technical assistance was given by a number of specialists. Dr. William M. Bass III and Walter H. Birkby, Museum of Natural History, University of Kansas, studied the human skeletal material. Dr. Hugh C. Cutler, Missouri Botanical Garden and Washington University, analyzed the corn from Huff and other nearby village sites. Mr. Loye Miller, Department of Zoology, University of California at Davis, identified the bird bones. Dr. J. Arnold Shotwell, Museum of Natural History, University of Oregon, assisted in the identification of animal bones and the stone from Huff. Dr. F. D. Holland, Jr., North Dakota Geological Survey, supplied data relevant to fossils at the site, and Dr. J. P. E. Morrison, Division of Mollusks, U.S. National Museum, identified the mollusks. Thanks to this multitude of assistance, and to the many courtesies of friends in Huff, Mandan, and Bismarck, it was possible to complete the sampling of this important village site.

The material recovered in 1960 was forwarded to the Department of Anthropology, University of Oregon, for study and analysis during the fall and winter of 1960–61. The final report on the Huff Site

(Wood, MS. b) and its subsequent interpretation in a doctoral dissertation (Wood, MS. c) was completed under National Science Foundation Grant No. G–12970, for "Northern Plains Prehistory: A One Year Archeological Study of Mandan Culture History." I am deeply indebted to Dr. L. S. Cressman, head of the Department of Anthropology at Oregon, and principal investigator for the grant, for his unfailing interest in promoting this research. The field maps, photographs, and specimens from Huff were ultimately returned to North Dakota and are now on file in the Museum of the State Historical Society, in Bismarck. A sample of pottery rim sherds from Huff was submitted to two institutions for their permanent comparative collections: the South Dakota Museum, University of South Dakota, Vermillion; and the Smithsonian Institution Missouri Basin Project, Lincoln, Nebr.

This study is the culmination of intensive archeological fieldwork in North and South Dakota between 1954 and 1960. My first training in this area began in 1951 as a field assistant to Robert Cumming, Jr., and continued in 1952, as assistant to Franklin Fenenga, both of whom were directing field parties for the Smithsonian Institution, Missouri Basin Project. I owe a great debt of gratitude to Fenenga, for his patient and extended discussions of archeological techniques and anthropological problems; it was under his tutelage in the field that I came to comprehend some of the problems in Northern Plains prehistory.

Undergraduate and graduate work in the Department of Anthropology, University of Nebraska, was done under Dr. John L. Champe, chairman of the Department, and under Drs. E. Mott Davis and John M. Roberts. My gratitude to each of these scholars is great, and to each of them I tender the most heartfelt gratitude for what I learned from them; they had much to offer.

Intensive fieldwork in the Northern Plains began in 1954, when I joined Alan R. Woolworth at the State Historical Society of North Dakota, in Bismarck, with whom I had the pleasure of working for the next 3 years. Much of the content of this study derives from fieldwork completed while serving as Woolworth's assistant, and he has generously permitted our joint site report manuscripts (now published) to be synthesized in this study. In this sense, much of the body of this report is as much his as my own, for it embodies the results of the disappointments and triumphs of our joint fieldwork for 3 years. I am genuinely sorry that we were unable to collaborate on the work done at Huff in 1960.

The last stages of my graduate work, in the Department of Anthropology, University of Oregon, were supervised by Dr. L. S. Cressman, head of the department, under whom my dissertation (the inter-

pretative portion of this study) was written. My deepest thanks are extended to him and to the staff of that department, whose stimulation and encouragement are warmly appreciated: Drs. Homer G. Barnett, Vernon R. Dorjahn, Raymond D. Gastil, and Theodore Stern. Drs. Kenneth W. Porter, Department of History, and J. Arnold Shotwell, Museum of Natural History, joined Drs. Cressman, Dorjahn, and Stern on my advisory committee.

Many people have directly and indirectly helped the research embodied in this report through the years of fieldwork and study. At the risk of omission, I must mention Russell Reid, superintendent of the State Historical Society of North Dakota, and J. Norman Paulson, museum aide of the Society; Paul Beaubien, late regional archeologist, National Park Service, Region II; Dr. Robert L. Stephenson, chief, Smithsonian Institution, Missouri Basin Project (now acting director, Smithsonian Institution, River Basin Surveys), and the following members of his office: G. Hubert Smith, Richard P. Wheeler, Dr. Theodore White, Dr. Charles H. McNutt, and Robert W. Neuman. Dr. Alfred W. Bowers, University of Idaho, Dr. Wesley R. Hurt, University of South Dakota, Dr. Edward M. Bruner, Southern Illinois University, and many others have contributed, through conversations and correspondence, knowingly and unwittingly, to this study. Drs. Donald J. Lehmer, Dana College, and Warren W. Caldwell, Missouri Basin Project, have particularly aided in the research. Frank C. Leonhardy and James A. Scholtz generously assisted in the proofreading of the dissertation. Permission to quote from pages 11 to 12 of Bruce Nelson's "Land of the Dacotahs" was granted by the University of Minnesota Press (copyright 1946 by the University of Minnesota). Dr. Erwin Raisz kindly granted permission to use a part of his map "Landforms of the United States" (from Atwood, 1940), 6th revised edition (1957), as map 18 in the text.

Alan Woolworth and I were both very fortunate in having hard-working, congenial crews, who, in the long run, moved the dirt and unearthed much of the basic data for this study. All of this assistance is gratefully and respectfully acknowledged: I hope that this work will be of some assistance to those who will continue to build upon the expanding framework of Northern Plains prehistory.

Finally, I must thank my patient wife, Bonnie H. Wood, without whose assistance this report would not have been written. I hope that it, in some small measure, is commensurable with the disadvantages incumbent on the wife of an archeologist through the months of distant fieldwork and through the often tedious weeks and months of actual writing.

An Interpretation of Mandan Culture History

By W. Raymond Wood

ABSTRACT

This study presents the results of a field excavation and subsequent research project which investigated the major hypothesis that Mandan Indian culture emerged about A.D. 1500 under the impact of trade and contact with semisedentary village peoples from the Central Plains, and with adjacent pedestrian nomads. The research began with an intensive analysis of the material from the Huff Site (32MO11) in the upper Middle Missouri area.

Huff is a prehistoric Indian site enclosed by a rectangular fortification ditch, earthwork, and bastioned palisade. These defenses enclose a village of 103 long-rectangular and four-post houses alined in rows parallel to the river, with the entrances facing away from the river. In the village center a large long-rectangular structure facing an open plaza is identified as the village ceremonial lodge. Huff is named as the type site of the Huff Focus, which includes several as yet unexcavated and tentatively identified components.

The village has been dated by tree rings between A.D. 1485 and 1543, a median date of A.D. 1500 for the occupation being acceptable pending additional dating.[1] The site is regarded as culturally intermediate between components of the Thomas Riggs Focus and sites of the protohistoric Mandan. The four-post house at Huff may represent one of the first stages in the shift from the older long-rectangular houses to the circular, four-post earth lodge of the historic period. Huff pottery approaches the types in the historic Mandan sites, but a number of stylistic changes still separate it from Mandan pottery.

The differences which place Huff apart from Thomas Riggs Focus sites are suspected to derive from down the Missouri River from sites affiliated with the La Roche Focus. The four-post house and several alien rim sherds are believed to be innovations deriving either from this source or one much like it. The unique fortification system at Huff is felt to derive from sites along the Missouri River to the south, below Pierre; there is no compelling reason to derive it overland from such Middle Mississippian sources in the Mississippi Valley as Aztalan.

[1] Five radiocarbon dates, received after this manuscript had gone to press, are discussed on pages 115-116. It has not been possible to modify the text throughout to take these new data into account.

The major hypothesis of the study derives from an analysis of the ecological, economic, social, and exterior factors which shaped Mandan culture history. The Mandan habitat is related to historic Mandan culture, and the archeological record of this group is reviewed from the earliest complex which may be regarded as culturally cognate with them to the historic period. Prior syntheses were found, with minor refinements, to be essentially sound. These data led to the formulation of the following archeological sequence:

Thomas Riggs Focus	A.D. 1100–1400
Huff Focus	1400–1600
Heart River Focus	1600–1797
Historic Mandan	1797–1886

The terms "Direct Tradition" and "Branch" both seem adequate as descriptive syntheses of the Mandan sequence as it is comprehended here.

Communities of the Thomas Riggs Focus are the earliest manifestations which can be attributed to the Mandan with any degree of assurance. This complex is postulated to derive from a syncretism of the Chamberlain Aspect with other local groups. The numerous settlements of this focus represent widely spaced, probably largely isolated and autonomous villages which occupied about 500 miles of the Missouri River Valley in North and South Dakota.

There is a heavy complement of Mandan elements as early as the Thomas Riggs Focus, but the basic structure of the historic Mandan does not begin to emerge until about A.D. 1500. At this time, the lightly integrated Thomas Riggs Focus village people abandoned their peripheral villages and formed a coalition consisting of the large fortified sites of the Huff Focus, clustered near the mouth of the Heart River. This contraction is postulated to have resulted from climatic desiccation and hostile outside pressure by nomads and/or nearby alien village groups. *Dentalium* from the Northwest Coast is inferred to represent trade with pedestrian nomads to the west, and there are ceramic and architectural elements at Huff suggesting contacts with alien village people farther down the Missouri River.

It is concluded that the dual nature of the contacts between the Mandan and their neighbors about A.D. 1500 elicited two responses. (1) The nomads or, perhaps, the village groups, were responsible for the coalition of the Mandan into compact, fortified villages; for more elaborate expressions of Mandan solidarity; and for an intensification of mechanisms for social control. (2) The contacts with downriver village groups provided new alternatives for a number of Mandan traits, many of which were adopted and subsequently displaced the Mandan equivalents. The major facets of historic Mandan

culture, then, emerged as a result of two separate factors: cultural cohesion resulting from nomadic aggression, and acculturation traced to adjacent village populations. These two forces shaped the formerly scattered Mandan villages into the tribe known to history.

INTRODUCTION

The goal of this study was a concise, comprehensive statement of the ecological, economic, and exterior factors which shaped Mandan culture history. The realization of such a goal has been, of course, impossible. Far too little work has as yet been done on the Mandan to permit any firm conclusions or assertions that have promise of withstanding continuing fieldwork. In this light, the present work can do nothing more than offer one set of hypotheses for future research to either validate or modify. The principal merit of attempting to explain the dynamics of Mandan development at this stage is, I suppose, that I felt the need for such a statement.

The Mandan were a Siouan-speaking, horticultural village group which moved into the Great Plains from the Eastern Woodlands. Archeological and botanical data, consistent with linguistic evidence, suggest that they are a western islet of eastern linguistic groups which separated from Proto-Siouan at an early date. Their movement into southeastern South Dakota is presumed to be reflected in sites tentatively attributed to the Chamberlain Aspect.

The significance of this project lies in part in the fact that an analysis of the development of the Mandan, a "type" tribe in the Northern Plains, should aid in the comprehension of the adaptation of the population to a Plains subsistence. That certain common factors may be operative in such adaptation is suggested by the fact that the total culture of the Mandan does not differ strikingly from other "Plains" complexes having semisedentary villages and practicing horticulture, abetted by hunting.

The principal hypothesis of this study is that historic Mandan culture emerged about A.D. 1500 under the impact of trade and contact with (1) sedentary village peoples from the Central Plains, and (2) adjacent pedestrian nomads. The results of contacts with these groups were quite different, but both acted to modify the prior culture of the Mandan.

The archeological record to be interpreted in this study begins with a brief resume of Paleo-Indian through Woodland complexes, to set the stage for the appearance of the Mandan themselves. Research in the years since 1906, when Will and Spinden published their volume "The Mandans," has failed to reveal the antecedents of that tribe locally. The earliest identifiable sites which can be reasonably equated with the Mandan appear in the Northern Plains as a full-

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blown complex. Since cultures cannot appear spontaneously, Mandan culture is most likely derived through migration or syncretism. Migration alone cannot be accepted as a satisfactory explanatory hypothesis since earlier manifestations of the complex elsewhere are lacking. Syncretism of two or more precedent complexes would create a new and distinct configuration of elements. Further, it provides a testable hypothesis which, if demonstrated, would give useful clues toward an understanding of the subsequent trends of Mandan development.

Once the Mandan are identifiable in the archeological record, they undergo markedly little change in economy or material culture. Most of the changes that do take place appear to have origins outside the group, rather than reflect internal change. The Mandan complex was gradually modified, partly owing to contacts with nomadic populations to the west and with more sedentary groups to the south. These contacts, in addition to progressive adaptations to the Missouri River valley environment, were essential factors in shaping the prehistoric complex into that of the tribe known from the historic period. The Mandan are reviewed through about 1886, at which date the tribe was removed to reservation lands. The post-Woodland sites and complexes discussed encompass approximately eight centuries, from about A.D. 1100 to 1886.

This study attempts to trace Mandan history in detail, however, only to about 1797. Data from documented, historic Mandan sites are rare, in no instance approaching the completeness of the record now available from the prehistoric sites. The reader desiring a statement of Mandan change for the historic period is referred to a study of differential change in Mandan culture by Bruner (1961). This study and that of Bruner are complementary, in that emphasis here is on prehistoric change whereas Bruner concentrates primarily on the historic scene. The analyses of both investigators, carried out independently, have led to essentially the same conclusions. Because Bruner's study reached print first, I have been able to cite his study in support of my own argumentation.

THE SETTING

ENVIRONMENTAL SETTING

The area of continental North America embracing North and South Dakota lies in the geographical center of that continent. These twin States (see map 18) are unequally divided, in a generally north and south line, into two great physiographic provinces: to the west, extending to the flanks of the Rocky Mountains, is the Great Plains Province; to the east, sweeping as far as the Great Lakes region, is the vast Central Lowlands Province (Fenneman, 1931).

The Missouri River is one of the most prominent and important natural features of the two Dakotas, entering North Dakota on its northwestern boundary and flowing along the eastern fringe of the Great Plains in a generally southeastern course through a broad, flat-floored valley, leaving South Dakota on its southeastern border. For its entire length through the Dakotas the major tributaries of the Missouri River head far to the west, some of them in the foothills of the Rocky Mountains. The Central Lowlands drain to the south, its streams entering the turbulent Missouri in southeastern South Dakota; to the north, the Red River of the North and the Souris River flow into the Canadian prairies, ultimately to empty into the Hudson Bay.

This is a land of contrast, for which one natural event is largely responsible—glaciation. Two to four ice sheets moved south across this region during the Pleistocene. The last glaciation largely obscured evidence of former ice sheets, although glacial drift 40 to 60 miles southwest of the Missouri River indicates that at least one early glaciation moved over the Missouri River valley (Hainer, 1956, p. 21).

The contrasts between the eastern and western Dakotas were sufficiently pronounced that they loomed as important factors in the earliest recorded literature of this area, Mandan origin traditions. East of the Missouri the land is a gently undulating to rolling and hilly plain, the end product of glacial drift deposited on the surface of an old, nearly level erosional plain. The division between the Great Plains and the Central Lowlands is marked by a prominent escarpment, the Coteau du Missouri, which is bounded by vast sheets of glacial moraines. The many small lakes and marshes along the Coteau result from the fact that erosion has not yet had time to develop a drainage pattern here, the land remaining essentially unchanged from the time of the retreat of the last glaciation. The Souris Plain and the valley of the Red River are the floors of former glacial lakes, stepped with beaches, while the hilly Turtle Mountains are the isolated remnants of strata removed by the erosion that created the surrounding erosional plain (ibid., pp. 7–13).

West of the Missouri the terrain was shaped more effectively by erosion, as distinct from the undissected blanket of glacial drift smothering the erosional plain east of the river. Popularly known as the "Missouri Slope," this is a land of wide, gentle slopes between west- to east-trending streams, but locally along these watercourses erosion has cut deeply into the soft clays and sands to sculpture the earth into barren forms so rugged and bizarre that they were long ago styled "hell with the fires out." Rising above the general level of the "Slope" are buttes 400 to 700 feet high, usually small but some-

times extensive. Among them is Black Butte, the highest point in North Dakota, 3,468 feet high. In southwestern South Dakota the Black Hills, a maturely dissected dome, provide the highest elevations between the Rocky Mountains and the Atlantic Ocean. Harney Peak reaches 7,242 feet in height, rising 4,000 feet above the surrounding prairie. In both Dakotas the land rises progressively to the west, from less than 1,000 feet along the Red River valley to 2,000 to 3,000 feet in the "Slope" area.

Most of the archeological work in the Dakotas, including the body of data herein treated, has been done along the valley of the Missouri River itself. Since the time this river stabilized itself in its valley it has been cutting on the downstream side of each of the many bends and simultaneously building extensive terraced bottoms on the upriver sides. At least three terraces are now discernible. Because of constant shifting of the river channel, the floodplain (Mt–0) rarely contains anything of archeological significance. An intermediate terrace (Mt–1), 35 to 45 feet above the river; and the upper terrace (Mt–2), which stands at heights of 80 to 100 feet above the river, both contain evidence of aboriginal occupation (Coogan and Irving, 1959).

The valley floor supports a heavy growth of timber, and Huscher and McNutt (1958, pp. 7–8) have noted a regular, ecologically determined sequence of forest types in the valley. Dense growths of willow accumulate on newly formed islands and bars. Such groves enlarge the bar by subsequently slowing flood waters passing over them so that additional silt is deposited. These willows are later replaced by a dense growth of cedar. On still older islands and on botton lands the cedars are replaced by a climax forest of mixed hardwoods: cottonwood, ash, elm, box elder, and hackberry. There is virtually no timber on the intermediate terrace today except locally along tributary streams.

Above the upper terrace the Missouri River bluffs customarily rise abruptly to a high, level, treeless upland, the monotony of which is broken by occasional tree-lined streams and by high, flat-topped buttes. From such elevations early travelers reported the vast herds of bison of former years, and views from the buttes provide sweeping panoramas of the Missouri River valley for as much as 20 miles of its course.

The plain above the river bottoms was formerly the range for several important game animals. Foremost was the bison, grazing in vast herds or, seasonally, in smaller groups. Elk, deer, and antelope were once plentiful and held an important place in the Indian economy. The bison and elk are now gone, but white-tailed and mule deer are still abundant. Smaller mammals of various signifi-

cance to the Indians included such carnivores as black and grizzly bear, badger, wolf, coyote, gray and Swift fox, kit fox, and skunk; among rodents were porcupine, beaver, prairie dog, jackrabbit, and cottontail. Wading birds such as the whistling swan and whooping crane, and birds of prey including the golden and bald eagles, the great horned owl, and crow were caught. Other birds included the Canadian goose, grouse, hawks, raven, and passenger pigeon. Fish, principally catfish and sturgeon, turtles, and mollusks were other fauna in aboriginal diets.

The continental climate of the Dakotas is marked by extreme seasonal temperature fluctuations, a growing season of variable length, and cyclical annual precipitation. The annual mean temperature ranges from about 36° to 44° F. Summer temperatures of 100° with low humidity are not rare, and subzero readings are commonplace in winter. The average growing season has about 121 days without severe frosts. Ordinarily, the last killing frost in spring is in early May and the first frost in fall occurs in late September. Precipitation is the most important climatic factor. Droughts may be severe, but much of the soil yields surprisingly well on little moisture, provided it is present when most needed. The average precipitation in the center of both of the Dakotas is between 16 and 17 inches; precipitation is greater in the eastern parts of the States, and lower in the west. About 75 percent of the annual precipitation falls during the corngrowing season (May–October) either as showers or as heavy rainstorms accompanied by thunder and lightning. There may be heavy snowfall in winter but snow cover is generally light, with occasional snowstorms with high winds and subzero temperatures. Wind velocities average 10 miles an hour. During the growing season the prevailing wind is from the south-southeast, but during the rest of the year winds are from the north-northwest (U.S. Dept. Agr., 1941, pp. 1045–1054, 1109–1118).

Aboriginal farmers appear to have been far less dependent upon precipitation than their modern representatives, for the Indians farmed the sandy river bottoms which they could till with their bone-shod digging tools. The Indian food plants were well adapted to the climate, as testified by the fact that many of them were taken over by modern seed companies for commercial development and distribution when imported varieties proved not hardy enough (Will and Hyde, 1917, pp. 24–29). While the dry years of the 1930's drove thousands of farmers from the Plains States, the prehistoric counterparts of these droughts may not have been as severe for the Indians, who hilled and mulched their gardens and conserved moisture (Will and Hyde, 1917, pp. 70–73, 97, 141–142). Nevertheless,

the limit of aboriginal horticulture at the time of European penetration of the Dakotas extended no great distance beyond the mouth of the Knife River in North Dakota, and even modern White farmers have been largely unsuccessful in their efforts to farm north of this point (Will, 1924 b, pp. 203–205).

The climate is severe and the land lacks many of the attractions of the more temperate and productive lands in the American Middle West, but the country offers compensations, for native populations grew to large size. One of the most sympathetic and, perhaps, partisan reporters of the Dakotas, Bruce Nelson (1946, pp. 11–12), has given a vivid work picture of this harsh but beautiful land of perpetual sameness yet of precipitous change:

> One who has not himself seen the northern plains can have no accurate conception of their nature. They have been called a desert; yet, while there are patches of arid land here and there, there are millions of acres of grassy prairies, innumerable creeks and rivers, and heavy growths of timber. They have been called a flat and monotonous prairie, but there are badlands of tortured and twisted beauty, buttes and bluffs and hills and valleys, and gently rolling plains that rise and fall like ocean swells as far as the eye can reach. And in the Black Hills this 'flat' land possesses the highest elevation between the Rockies and the Atlantic seaboard: Harney Peak.
>
> The plains have been called treeless, but there are great forests, and all the creek and river valleys are lined with lofty cottonwoods and thick with low-hanging willows. They have been called cold, yet the thermometer sometimes rises in midsummer to 120 degrees; and they have been called hot, although winter temperatures occasionally drop to 40 degrees below zero or lower. They have been called barren, these plains that once supported such a wealth of wild game and profusion of natural vegetation; and this, too, is partly true, for in the 1930's the prairies lay parched and lifeless, but in the 1940's they produced such a wealth of grain and livestock that their wheat crops alone were measured in the hundreds of millions of bushels and lay spoiling on the ground for lack of storage and transportation facilities.
>
> It is a land of savage extremes, this land of the Dacotahs, of bitter cold and intense heat. Yet in spring there are balmy air and soft winds and the revivifying green of prairies grass and flowers, and in fall, when summer's head has dwindled, the flaming gold and scarlet of wooded hill slopes. But in winter, when the whistling winds knife southward from Saskatchewan and Manitoba, the air is filled with stinging pellets and the blanketed earth lies cold and rigid as iron. The clear bright days of summer turn suddenly black with the purple menacing clouds of the prairie hailstorm, and hot summer nights erupt into flashing thunderstorms of incredible awesomeness and beauty: every lowering cloud hurls its lances of flame earthward and the thunderous artillery of the skies is continuous and deafening. There are times of drought and protracted heat, when the land lies prostrate and gasping, the prairie roses droop and die, and the very native grasses wither; and there are times of fearful flood and disaster, when the glutted rivers spread destruction over the level bottomlands.
>
> It is a land of superb sunsets and magnificent distances, of limitless arch of sky. On its eastern border the broad yellow curve of the Missouri sweeps sharply southward toward the sea; to the west the jagged peaks of the Rockies thrust themselves up boldly, like a great sinew in the shoulder of a sprawling continent.

And between river and mountain range is the vast running sweep of the plains country: prairie and hill and lake and forested valley.

And always there is the wind . . . .

CULTURAL SETTING

The Mandan Indians may be briefly characterized as a Siouan-speaking, semisedentary village tribe which resided, at the time of the earliest contact with Europeans, in fortified circular earth lodge villages in what is now the State of North Dakota. Their villages, situated on terraces adjacent to the Missouri River, were large aggregates of dwellings surrounded by a dry moat and a post palisade. Economically, they were almost equally dependent upon horticulture and hunting, drawing lesser subsistence from gathering. They occupied a restricted locality near the mouth of the Heart River, which was to them the heart of the universe. In one myth, for example, the earth is pictured as an earth lodge, with the Heart River as the fireplace (Bowers, 1950, p. 280, note 1).

The Hidatsa lived on the lower reaches of the Knife River, a short distance to the north. The Mandan and Hidatsa share a strong feeling of unity based on common traditions and on linguistic similarities, although the languages are mutually unintelligible. On the basis of tradition and speech they extend this feeling of oneness to embrace the River and Mountain Crow, who lived as nomads to the west, in present-day Montana. But in every sense the closest and most intimate ties were with the Hidatsa, from whom they differed only slightly. South of the Mandan, downstream along the Missouri River, were the Caddoan-speaking but not culturally distant Arikara. Together, these groups are known as the "Three Tribes," or as the "Prairie Villagers."

ORIGIN TRADITIONS

The traditional histories of the Mandan and Hidatsa have been collected by early travelers in the Dakotas as well as by more recent ethnographic fieldwork. The origin traditions and, to a lesser extent, other traditions provide clues, however elusive, to the histories of these cognate tribes. The Mandan migration traditions are separate and distinct from those of the Hidatsa, although each episode contains references to the other.

There are two distinct and conflicting Mandan origin myths. In the first version of creation (Bowers, 1950, pp. 347–365; Beckwith, 1938, pp. 1–21; and Maximilian, 1906, vol. 2, pp. 304–312) the Heart River is the heart of the universe, where two culture heroes, Lone Man and First Creator (Coyote), created the earth and where all rites and ceremonies are said to have originated. Lone Man created the flat prairies east of the Missouri River, while First Creator fashioned the

rugged terrain west of the Missouri which was the preferred hunting territory of the Mandan. While this version depicts the Mandan as an indigenous group spontaneously originating in their historic habitat, a second version presents a very different story (Bowers, 1950, pp. 156–163; Beckwith, 1938, pp. 10–11; Maximilian, 1906, vol. 2, pp. 312–317; and Catlin, 1876, vol. 1, pp. 178–180).

According to Wolf Chief's version of the latter tale (Bowers, 1950, pp. 156–163), the Mandan originated on the right bank of the Mississippi near the ocean, where they emerged from beneath the earth, bringing corn with them. Their chief was named Good Furred Robe. Moving north, they reached the mouth of the Mississippi River, where they found people living on the other bank in a large village. They could understand these people and considered them as Mandan. Continuing north until they reached the mouth of the Missouri River, they crossed to its north bank and resided there for a time. They then moved on up the Mississippi, settling not far from the pipestone quarries in Minnesota. About this time one clan moved to a point north of the Turtle Mountains, "building villages along the way," where they remained until they later moved west to the Missouri River. The rest of the Mandan moved southward, settling another village with lodges of the "eagle trapping type with grass and dirt covering the sides." Not long after, the Mandan rediscovered the Missouri River, moved west, and built a village on the east bank, opposite the mouth of White River. At this time, the Awigaxa band vanished, and although some of them later returned, they talked differently. Under the continued direction of Good Furred Robe, the rest of the tribe moved north along the Missouri until they reached the Heart River, where they joined the others whom Lone Man and First Creator had placed there. They continued to live in this vicinity until their discovery by European explorers.

The Hidatsa traditions, as well as those of the Awatixa and Awaxawi (Amahami) groups, have been summarized by Bowers (MS. a, pp. 18–19).[2] The Amahami, like the Mandan, claim to have emerged from the earth far to the southeast long ago, and to have moved north. They lived along streams in eastern North Dakota and western Minnesota, ultimately reaching Devils Lake. They remained here for a time before advancing to the Missouri River, where they found the Mandan, as well as a village of their own people, the Awatixa, nearby. The Hidatsa proper, including at that time the River Crow, separated from the Amahami in western Minnesota. This group moved north until they dwelt in a land where winters were very severe, later moving south to Devils Lake. They discovered the

[2] See also Bowers, 1965, pp. 297–303, for a more exhaustive statement regarding Hidatsa mythology.

Mandan soon afterward and also moved to the Missouri River, taking up residence north of the Knife River and the Mandan villages. The River Crow separated from them here and moved west into present-day Montana, and the Hidatsa moved to the mouth of the Knife River and established their villages.

These sources provide interesting data for the comprehension of the history of the two tribes. The accuracy of the Mandan traditions is evaluated in later pages, but Bowers was deeply impressed with the conservatism of the Mandan in details of social and ceremonial organization, no significant changes having been introduced between the early 1800's and the 1930's. This same observation may be extended to the folklore, which was intimately associated with their ceremonialism. But if the migration tradition is acceptable as generally accurate, it appears that each and every myth exclusive of the second version of the migration tradition has been reinterpreted so that even minor landmarks are now integrated with the mythology. This fact alone testifies to an extended residence in the vicinity of the Heart River. The numerous divisions of the tribe, their erratic movements, and other factors deduced from the folklore highlight the probability that Mandan archeology will become substantially more complex than present data suggest.

LANGUAGE, COMMUNICATION, AND RECORDS

The Mandan are Siouan speakers, their nearest linguistic relatives being the Hidatsa and Crow (Dorsey, 1885, pp. 919–923; Voegelin, 1941, pp. 246–249). There were some minor differences between the dialects of the different bands (Maximilian, 1906, vol. 2, p. 259; Bowers, 1950, p. 25). Other related languages include:

Dakota (Santee, Yankton, Teton, Assiniboin)
Dhegiha (Omaha, Ponca, Kansa, Osage, Quapaw)
Chiwere (Iowa, Oto, Missouri)
Winnebago
Catawba (Atlantic coast: extinct)
Tutelo (Virginia: extinct)
Biloxi (Mississippi-Alabama coast: extinct)
Ofo or Mosopelea (Southwestern Ohio: extinct)
Hidatsa-Crow

Voegelin includes Mandan with Dhegiha and Chiwere, and perhaps Dakota, in a "Mississippi Valley" subgroup. Mandan and Hidatsa-Crow are separate, and Wolff (1950, pp. 61–62) regards Winnebago as most nearly like Chiwere, and, since Mandan is more archaic than Dakota, Mandan may have been among the first to separate from Proto-Siouan. It is relevant that, except for the Crow, all of these tribes lived well to the east and southeast of the Mandan.

Maximilian (1906, vol. 2, pp. 365–366) reports that the Mandan were "more apt in learning foreign languages than many other nations." Most of them spoke Hidatsa, although few of the latter learned Mandan. Catlin (1876, vol. 1, p. 186) makes the same observation. In view of their role as middlemen in a vast trade network, discussed later, it was probably mandatory that they comprehend a large number of different languages.

Like other local tribes thay had a mnemonic device used for calendric purposes: the winter count, a series of pictographs painted on hides, each of which represented a "winter." M. W. Smith (1960, pp. 199–205) interpreted this technique of calendar-keeping to mean that history, to them, was "in large part a set of interlocking life histories" much like our own concept of history.

SOCIAL AND POLITICAL ORGANIZATION

The villages of the Mandan may be regarded as constituting a tribe for several reasons: (1) They shared common social and ceremonial organizations, (2) clans extended through all the villages, and (3) the entire tribal population was classed as relatives and were treated as such. Mandan village leadership was vested in a council of bundle owners, from whose ranks the war chief and the peace chief were chosen. The most important of the ceremonials was the elaborate Okipa, which was essentially a dramatization of Mandan creation and history. The owner of the Okipa bundle was the most important social leader of the village. Daily activity and the yearly cycle was rigorously regulated by tradition.

The political structure of the Mandan has received little attention, but a number of generalizations by Roberts (1964) are germane to our study of Mandan culture history.

> The Mandan . . . villages were not organized into a tribal unit possessing formal methods of communication and retrieval. Indeed, the Mandan had only the rudiments of a tribal organization [for] it would appear that there were no organized political institutions overarching the villages during the period when the tribe was flourishing. [Roberts, 1964, pp. 448–449.]

On the other hand, Murdock (1959, table 1, p. 683) has characterized the several compact villages or towns of the Mandan as "Minimal states, i.e., political integration in independent units averaging between 1500 and 10,000 in population" (ibid., p. 674). This characterization is apparently based in part on the following statement by Bowers:

> Although each permanent Mandan village was in a large measure a separate economic, social, and ceremonial unit, the villages were not entirely independent. The turtle drums, which were considered the most sacred objects of the tribe, were held within the Nuptadi band of east-side Mandan, and the other villages

were obliged to borrow them for ceremonial purposes. Whereas the sacred cedar in the center of the village was the symbol of village unity, the Mandan considered the turtle drums a symbol of tribal unity. [Bowers, 1950, p. 36.]

Since chiefs could not prevent intravillage warfare any more than they could prevent the removal of part of a village to form a separate village (Bowers, 1950, p. 36), the "political integration" of the Mandan villages was little more than a ceremonial fiction. The villages were in fact all but totally politically autonomous in spite of the ceremonial symbols of tribal unity. Rather than being a "minimal state," the Mandan consisted of "Autonomous local communities, i.e., politically independent local groups which do not exceed 1500 in average population" (Murdock, 1959, p. 674), even though the total tribal population was probably in excess of 5,000 before smallpox decimated them. Furthermore, the use of the term "state" itself in reference to the Mandan is misleading. Thirty years ago, Linton made the following distinction between "tribe" and "state":

> The formal organization of tribes, and with it the degree to which they can control their members, varies so much that it cannot be used as a criterion for determining what constitutes a tribe and what does not. The real test is whether the members of the tribe consider themselves a single society, and this seems the only valid reference point for distinguishing between *tribe* and *state*. The tribe is a social entity, while the state, as the term will be used here, is a *political* entity. . . . While most of the tribe's activities are automatic and largely unconscious, those of the state are deliberate and conscious. [Linton, 1936, pp. 239–240.]

The Mandan, without a doubt, were a tribe, but they cannot be regarded as even a "minimal" state.

Villages consisted of a number of matrilineal, exogamous, nontotemic clans divided into nameless matri-moieties. These clans comprised one or more matrilineages closely identified with the household, a matrilineal, matrilocal unit composed of one to three independent polygynous families. The household was the smallest economic unit, and such a group could leave a village at will and move to another village, where it affiliated with its nearest relatives. Marriage was outside the clan and preferably with a member of the other moiety. Both the levirate and sororate were factors in marriage (Bowers, 1950, pp. 26–37, 111).

Lowie (1917, p. 8), in addressing himself to the problem of "how to conceive the relation of the villages to the social divisions" (clans), availed himself of a passage in Maximilian's journals (1841, vol. 2, pp. 103–104), here quoted from the Thwaites edition (1906, vol. 2, pp. 253–254):

> They call themselves Numangkake (*i.e.*, men), and if they wish to particularize their descent, they add the name of the village whence they came originally. Some, for instance, call themselves Sipuske-Numangkake, the men of the bear,

from the village Mato-Mihte, bear village, &c . . . Though the above-named villages do not all exist at this time, these Indians still call themselves by their several names.

Lowie (ibid., p. 8) then proceeds with the assertion that:

This is a clear-cut statement that the Mandan clans developed in recent times from formerly distinct local groups.

This is a conclusion of no mean value to the prehistorian if it is amenable to verification by archeological techniques and is not simply the result of a systemizing tradition. Archeological data (pp. 157–158) suggest that prehistoric Mandan villages were isolated and autonomous, and Lowie's suggestion that Mandan clans developed from formerly distinct local groups is reinforced by the analysis of Mandan political structure. The near if not total autonomy of historic Mandan villages appears to be an expression of a long-standing tradition of autonomy of subtribal units.

The inheritance of potterymaking techniques follows the general pattern of inheritance (Bowers, 1950, pp. 52, 62, 91–92, 283). The techniques and decorations applied to pottery were said to be "secret." When the women of the household were making pottery the girls would make their own crude vessels, but when they were older they bought the knowledge and prerogatives of technique and decorative patterns from their mothers or clanswomen. The mother or grandmother explained the steps in pottery manufacture, from the selection of clay and grit through drying and firing the completed vessel. Pottery was embellished with a number of patterns, and the woman buying the right to make pottery was permitted to use only those patterns her mother had the prerogative to make. If a woman desired to use other patterns it was necessary to purchase the right from the person owning the decoration (see pp. 72–73).

VILLAGES AND DWELLINGS

Historic Mandan settlements consisted of tightly grouped clusters of dwellings within an enclosing dry moat and palisade. The stoutness of these defenses made their homes virtually inaccessible to direct assault. The ditch, surrounding the village on the sides facing the prairie, was augmented by a vertical post palisade along its outer edge. The line of the ditch and palisade was interrupted by strategically placed protruding bastions, from which enfilade fire could be directed against warriors assaulting the palisade wall.

Each village was politically independent. For the most part, the villages were also separate economic, social, and ceremonial units, although each was sometimes dependent upon others for ceremonial assistance and they acted collectively in time of war (Bowers, 1950, pp. 36–37). Households could leave one village

and join another at will. Several related households commonly moved as a unit to another village, where they affiliated with their nearest relatives. Such moves were not uncommon, and were precipitated by internal conflicts and by the availability of tillable land near the village site. Related families tended to live near one another within the village (Bowers, 1950, pp. 26, 28).

The procedure in village planning was as follows: the owners of the Corn bundles selected the village site, and the individuals impersonating Lone Man and Hoita (Speckled Eagle, representing the People Above) laid out the village plaza, the ark of Lone Man, and the ceremonial lodge (Bowers, 1950, p. 194). The sequence of events parallels in large measure the steps described by Wilson (1934, pp. 351–352) for laying out Like-a-Fishhook Village. The important medicine men sat down to plan the village, and asked Missouri-River, the owner of the most important bundle in the tribe, for his suggestions. Missouri-River walked in a wide circle which circumscribed the area which became the village plaza, then the medicine men asked three of the powerful men of the tribe to choose lodge sites, after which Missouri-River chose his site. All these men selected positions adjacent to the plaza. Missouri-River then said: "This is all. Rise. The rest of you may choose lodge sites, but keep the circle open as I have marked it."

Each village reserved this open plaza, about 150 feet in diameter and near the village center, for the Okipa ceremony (fig. 14). No houses were permitted in this area, although there were occasional scaffolds erected in it. The center of the plaza contained a cedar post representing the body of Lone Man, surrounded by a barrel-shaped wall of planks, symbolizing the wall built by Lone Man to protect the Mandan against a mythological flood. This structure was secured by willow rods, which marked the highest advance of the waters. The houses around the perimeter of this plaza were occupied by officials of the Okipa and other prominent men, and the entrances of the dwellings faced the sacred cedar (see Catlin, 1876, pls. 47, 67, 69).

The village ceremonial lodge, in which the rites of the Okipa were carried out, was north of the cedar. This building was distinguished from other lodges by its relatively greater length and a flat front at the entrance, which faced south toward the plaza (fig. 14). Each moiety built and owned opposite sides of this lodge, symbolized as "Corn" and "Buffalo." It was occupied by a prominent male of the principal clan (WaxikEna) and his family, who acted as custodians (Bowers, 1950, pp. 111–115; Catlin, 1876, vol. 1, pp. 88, 158; and Maximilian, 1906, vol. 2, p. 269).

The women built the earth lodges with the help of their clan members, except for the assistance of men in raising heavy beams (Bowers, 1950, p. 82). Several forms of dwellings were in use, but the principal ones were three-pole tipis (Wilson, 1934, p. 420) and circular earth lodges. The general floor plan of the earth lodges did not vary strikingly from those used by the Hidatsa and Arikara.

The summer earth lodges were circular dwellings, perhaps built over shallow pits. There was a rock-lined basin fireplace in the house center, around which were four large center posts, connected by crossbeams. Eleven to fifteen posts were set along the walls and were connected by stringers. A covered entrance passage projected from one side, toward the village center and *away* from the river. The entire structure was covered with rafters and sealed with grass and willows, and capped with a layer of earth and clay.

Maximilian's description and plan (1906, vol. 3, pp. 37–40) of a Mandan winter earth lodge shows a fire screen of "reeds and osier [willow?] twigs woven together," and Wilson's plans (1934, p. 386) of Hidatsa lodges show a fire screen consisting of puncheons set in a shallow trench between the entrance and the fireplace. Both screens necessitated a turn to the right on entering the house. Such houses were commonly occupied from 7 to 12 years, contained 4 to 8 beds, and housed 5 to 16 individuals (ibid., pp. 358, 372). An average of 10 individuals to a house seems a reasonable estimate. The winter villages, built in timbered areas in river bottoms to avoid winter winds, consisted of smaller models of the summer lodges (Maximilian, 1906, vol. 2, p. 272).

According to Bowers, the standard earth lodge was not adopted by the Mandan until they reached the Missouri River. Before this time they dwelt in a simplified variant of the earth lodge known as the "eagle trapping lodge." Four center posts were erected, and rafters were leaned upon their cross members from the ground, leaving an opening at the top for a smoke hole. The sides were covered with flat bark, grass, and earth. Elderly people with no relatives to care for them built such lodges even as late as the occupation of Like-a-Fishhook Village, since they were easily repaired. Such lodges were 20 feet or more in diameter (Bowers, MS. a, p. 71).

The houses were crowded together within the fortification system with little spare room. Lewis Henry Morgan (1871, p. 43), visiting the abandoned site at Fort Clark in 1862, highlighted the crowded conditions when he wrote:

> These houses were thickly studded together to economize the space within the stockade, so that in passing through the village you walk along semi-circular foot paths which turn at a few paces both to the right and left. There is not only no street, but it is impossible to see in any direction except for short distances . . . The foot paths tread a labyrinth of circular houses.

He continues that even the open spaces between the houses contained drying scaffolds, about one for each house. Sanitation in such crowded conditions must have been a problem, a lead to which is provided by Libby (1906, p. 434) when he states that village law, enforced by the Black Mouth Society, enjoined the disposal of rubbish over the riverbank. La Vérendrye (1927, p. 339), in 1738, attested to the neatness of the village he visited: ". . . They keep the streets and open spaces very clean . . . ."

The crowded nature of the villages, as Morgan states, was a function of economizing the space within the defensive ditch. The labor of digging such a ditch, several feet deep and several hundred yards in length, must have been immense, but the very survival of the Mandan in the face of the hostile Dakota depended upon its strength. Such works were built and weak spots repaired by the women, under the supervision of the Black Mouth (soldier) Society, as Lowie (1913, p. 279) reports for the Hidatsa. A number of early travelers have described, often inconsistently and all too briefly, the construction of the defensive works. The earliest account is that of La Vérendrye (1927, p. 339) in 1738:

> . . . the palisade is supported on cross pieces mortised into posts fifteen feet apart with a lining [of] green hides fastened only at the top in places where they are needed. As to the bastions, there are four of them at each curtain well flanked

Catlin (1876, vol. 1, p. 81), visiting Fort Clark in 1832, is somewhat more specific:

> . . . a strong piquet, and a ditch inside it, of three or four feet in depth. The piquet is composed of timbers a foot or more in diameter, and eighteen feet high, set firmly into the ground at sufficient distances to be fired between them. The ditch . . . is inside the piquet, in which their warriors screen their bodies from the view and weapons of their enemies . . . .

Maximilian (1906, vol. 2, pp. 266, 269), visiting the same village a year later, provides a second eye-witness account of the same defenses:

> The [ditch] forms an irregular circle, and was anciently surrounded by strong posts, or palisades, which have, however, gradually disappeared . . . . At four places, at nearly equal distances from each other, is a bastion built of clay, furnished with loop-holes, and lined both within and without with basket-work of willow branches. They form an angle, and are open towards the village; the earth is filled in between the basket-work; and it is said that these bulwarks, which are now in a state of decay, were erected for the Indians by the Whites.

The latter statement is anything but true, as the advent of such fortifications significantly predates the appearance of Europeans, not only locally but elsewhere in North America. Bodmer (see Thwaites, 1906, vol. 25, pl. 58) illustrates the palisade in the background of one of his plates of a shrine outside the village at Fort Clark.

BURIALS

Mandan cemeteries were 200 to 300 paces from the village; they consisted of numerous rectangular, four-post scaffolds on which the dead were placed in "aerial sepulchre." Both Catlin, in 1832, and Maximilian, in 1833, described the burial practices carefully (Catlin, 1876, vol. 1, pp. 89–91; Maximilian, 1906, vol. 2, pp. 340, 360–362). When an individual died, the corpse was quickly removed from the village. The face was painted red, and the body was richly dressed, oiled, "feasted," and supplied with weapons, pipe and tobacco, and provisions adequate for several days. The remains were wrapped in bison skins and tightly wrapped with thongs and placed on the scaffold with the head to the east (Maximilian; also Beckwith, 1938, p. 38), west (Catlin), or northwest (Bowers, 1950, p. 99).

When, in time, the scaffolds collapsed, the desiccated bones of adults were gathered together and buried in the village refuse or along the river and creek banks. The skulls were often placed in shrines in a circle on the ground, 20 or more feet in diameter, near the scaffolds. One passage in Maximilian (1906, vol. 2, p. 361), suggests that the burial modes had but recently changed, for he asserts that the Mandan declare that:

> The Lord of Life [First Creator] has, indeed, told us that we come from the ground, and should return to it again; yet we have lately begun to lay the bodies of the dead on stages, because we love them, and would weep at the sight of them.

Bowers reports that one of his informants thought that suicides were buried (1950, p. 100), and Maximilian says (1906, vol. 2, p. 384) that among the Hidatsa only those who quarrel and kill each other were buried. The Hidatsa also preferred scaffold burial, but Lowie (1917, pp. 51–52) asserts that the choice of burial was left to the dying man. Scaffold burial was customary, but less frequently the body was placed in a pit and covered with earth (see also Beckwith, 1938, p. 240).

INTERTRIBAL TRADE

At the time of Lewis and Clark there were two principal trading centers in the northern Dakotas. One of them was the Mandan-Hidatsa villages at the mouth of the Knife River, and the other was the Arikara villages downstream, at the mouth of the Grand River. There were three main routes by which horses and other goods came into Mandan hands, each of them involving exchange with nomadic hunters who came to the Mandan villages to trade. (1) The Crow came to their villages from the upper Yellowstone with goods obtained from the Shoshoni Rendezvous in southwestern Wyoming. Here, the Crow obtained goods from the Shoshoni as well as goods from the west from the Nez Percé and the Flathead, and from the Spanish

Southwest from the Ute. (2) Another route, suspected of being the older, was between the Spanish Southwest and the Mandan and Arikara by the nomadic Kiowa, Kiowa-Apache, Comanche, and Cheyenne and Arapaho. Of these groups, the Cheyenne and Arapaho were probably participants only after having left the Minnesota forests, and the Kiowa and Kiowa-Apache seem to have been more active than the Comanche. (3) The Mandan and Arikara also exchanged goods with the nomadic Cree and Assiniboin, who lived to the northeast (Ewers, 1955, pp. 7–14, fig. 1; 1954, pp. 430–431).

Ewers has pointed out that these trade routes emphasized exchange between nomads and horticulturalists: the nomads brought dried bison meat and other produce of the chase to trade for corn and other products of the villagers' gardens. This must "have had the effect of intensifying the labors of the nomads and the horticulturalists in their own specialities" (Ewers, 1954, p. 435), the nomads working harder at the chase, and the horticulturalists harder in their gardens in order to have the necessary surplus for trade. From his studies of the diffusion of the horse and from aboriginal trade patterns, Ewers (1955, p. 14) deduced that the horse trade exemplified "an historic elaboration of a prehistoric trade pattern among the Plains Indians," but he (1954, pp. 435, 440) cautions the prehistorian that the nearly exclusive exchange of perishables renders archeological detection of a true picture of this trade impossible. Among the few items which offer promise to the prehistorian are *Dentalium* and *Olivella* from the Pacific coast. Maximilian (vol. 2, p. 289 n.) commented on the importation of the former shell as follows:

> The dentalium shells were by intertribal exchange brought from the Pacific Ocean; the Mandan prized them so highly that white traders began to import them.

Dentalium was used as ear ornaments, as described in another passage from Maximilian (ibid., p. 285) which corroborates his statement quoted above:

> . . . they make some apertures in the outer rim of the ear, in which they hang strings of beads, brass or iron rings . . . or shells, the last of which they obtain from other Indian tribes. If they are questioned respecting these shells, they answer that they were brought from the sea.

Bodmer (see Thwaites, 1906, vol. 25, pl. 24) illustrates this usage of the *Dentalium*.

THE FOOD QUEST

Mandan subsistence rested equally on hunting and horticulture, with minor reliance on the gathering of wild food plants. Hoe cultivation was carried on by women in the fertile, sandy river bottoms, the soil being tilled by bone-shod digging tools, principally a scapula

hoe lashed to a wooden handle. Maximilian (1906, vol. 2, pp. 241, 276) said that each family cultivated 3, 4, or 5 acres each, a figure quoted with approval in Will and Hyde's study of aboriginal maize horticulture, with yields of 20 to 40 bushels to the acre (Will and Hyde, 1917, pp. 99–100, 142). When the plots were exhausted they were allowed to lie fallow and new plots were opened. Principal crops were flint and flour corn, beans, squash, pumpkins, and sunflowers. Tobacco was grown by the men. In line with the earlier comments relating to trade with the Pacific coast, the following statements by Lowie (1963, p. 28) seem particularly relevant:

> The Hidatsa, Mandan, and Arikara cultivated *Nicotiana quadrivalvis*, the Crow *N. multivalvis*. Botanically, both these varieties are related to *N. bigelovii*, which appears wild as well as cultivated in California and Oregon; and they are conceived as having originated from this Pacific form by simple mutations. It is a suggestive fact that the word used by the Crow and Hidatsa for tobacco is *ōp, ōpe*, which is virtually identical with the terms applied to it by the Diegueño of southern California, the Shasta in the northern part of the state, and the Takelma of Oregon. Since the majority of Siouan tribes have other words for tobacco, it seems reasonable to suppose that *N. bigelovii* was diffused from the coast inland, along with the native designation, and mutated into *N. quadrivalvis* among the Hidatsa and *N. multivalvis* among the Crow.

If this conclusion is verified by continuing work in plant genetics, the dependence of the Northern Plains groups on trade and contact with the Pacific Coast will be greatly underscored.

The village crops were sometimes poor but they rarely failed entirely. The harvest was stored in the villages in deep, bell-shaped pits which held 20 to 40 bushel lots. In times of plenty corn was abundant enough that Maximilian (1906, vol. 2, p. 273) mentions that it was fed to horses. The fields were prepared in May and harvested in October. The latitude of the land demanded hardy, quick-ripening plants, and the success of the Mandan farmers is ample documentation that most of their plants were well adapted to the cold, dry climate. Gathering provided root plants and fruits for the diet. Juneberries, chokecherries, wild plums, feverol, and Indian turnip (tipsin roots) were among those collected.

Game was abundant; bison, providing the bulk of the proteins, deer, antelope, bighorn sheep, and, more rarely, beaver, rabbit, bear, and waterfowl were taken for food. Wolves, foxes, ermine, mountain lion, eagles and other birds of prey were hunted for their hides and plumes.

Bison were hunted throughout the year when they were found near the villages. The summer hunt was an important part of the yearly cycle, and was scheduled after the preparation of the gardens and after performing the Okipa ceremony. The Mandan hunted exclusively in the rugged lands of the "Slope" west of the Missouri River, ranging

to the course of the Little Missouri River in western North Dakota. The men butchered the animals and brought the flesh to the camps, where the women remained to cut and dry it on scaffolds, The hunt was ended and the people returned to the village before the corn was in the milk stage (Bowers, 1950, pp. 88–90).

After harvesting the gardens many families moved west into the badlands along the Heart River and other streams to trap eagles. These eagle-trapping excursions had a dual purpose: the securing of feathers and augmenting the winter's supply of meat and hides. In the latter purpose it might be regarded as an adjunct to the summer bison hunt. There were eagle-trapping lodges at permanent sites, to which the men and their wives went, carrying with them pottery and other necessary items (Bowers, 1950, pp. 232–233, 355).

Antelope, second in importance to bison, were driven in large groups into enclosures and killed with stone clubs. Pitfalls were used to catch smaller game, and fish were taken from the river in traps and with hook and line. When the ice on the Missouri River melted during the spring thaw, the Mandan retrieved the bodies of drowned bison from the river below their villages. The meat of such animals was preferred to fresh meat. Other sources of meat included the dried bison meat traded to the Mandan by western nomads in exchange for garden produce.

COMMENTARY

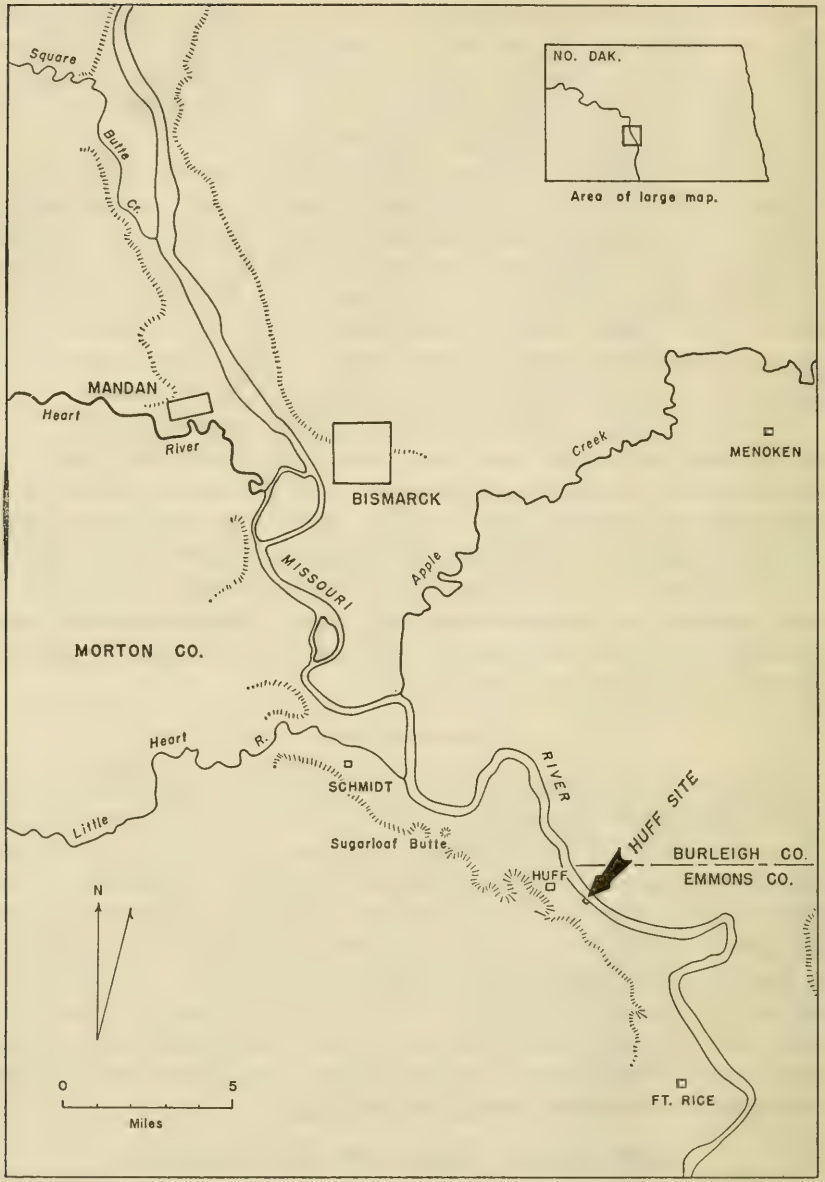
At the time of European contact, the Mandan and Hidatsa were living in relative prosperity in their fortified villages along the Missouri River. Their villages were important centers of trade between the nomadic hunters to the west and southwest and the tribes of the prairies to the northeast. Their movements before European contacts are obscure, but there is little doubt that conditions in the Northern Plains were quite different before they settled in their historic habitat and developed their role as trading intermediaries. Following the presentation of the basic data from the Huff Site, attention will be directed to some of these conditions, and to their movements as detected through archeology.

NEW DATA: THE HUFF SITE (32MO11)

FIELDWORK

THE SITE

The Huff Site is situated in the center of the line separating sec. 5 and sec. 8, T. 136 N., R. 79 W., Morton County, N. Dak. It is on the west, or right, bank of the Missouri River 18 miles southeast of the city of Mandan, and one-half mile southeast of the hamlet of



MAP 1.—Vicinity of the Huff Site (32MO11) and the Missouri River Valley near Bismarck, N. Dak.

Huff. The Missouri River here flows to the southeast with a current of about 5 miles an hour (maps 1, 2). The village site was built adjacent to the riverbank on a high terrace which has never flooded, although lateral erosion by the river has carried away part of the site. The village is between two deep ravines, although the occupational area itself is on flat prairie without appreciable relief. The Missouri River bluffs rise abruptly from the valley floor about a mile to the southwest.

In 1960 the village consisted of a continuous fortification ditch, earthwork, and palisade about 2,130 feet long which enclosed an area of about 8.5 acres. This fortification system is rectangular in plan, measuring approximately 700 by 800 feet, and encloses the village on three sides. The side facing the river is protected by a precipitous bank 43 feet high, which is roughly parallel to the long axis of the enclosure provided by the fortification. Since this large site has never been cultivated, the village plan is unusually distinct.

The ditch is visible as a shallow trench 15 feet wide and with an average depth of 2 feet. The soil which the builders removed from this ditch was thrown to the site interior, resulting in a low but obvious ridge inside the ditch. This ditch is relatively straight on the southeast and southwest sides of the village, but it is conspicuously convex on the northwest side. Ten bastions project out from the main enclosure at fairly regular intervals. There is a bastion on the south and the west corners of the village, and the others are spaced from 180 to 240 feet apart along the remainder of the entrenchment. The bastions project well into the ditch, creating a corresponding bulge in its opposite side (pl. 2, *a*). The houses within this elaborate defensive system are predominantly long-rectangular, and are clearly visible as rectangular depressions in the sod. A contour map was prepared of the most distinct house depression (see map 15), and it may be taken as representative of the rest of the houses.

The site map (see map 4), showing a total of 103 houses, was made from a vertical aerial photograph taken by the North Dakota National Guard from an elevation of about 1,000 feet (pl. 1, *b*). The map was prepared from a projection of this photograph without compensation for parallactic displacement (H. T. U. Smith, 1943, p. 37), and consequently it cannot be regarded as a precise plat of the village, although it is unquestionably accurate in major details.

The houses in the village are roughly alined in rows, or lanes. They are not spaced in such rigorous order that they deserve to be termed "streets." With the exception of House 20, the long dimension of each house is northeast-southwest, and in each of the excavated houses the entrance faced *away* from the river. The exceptionally large House 2,

in the approximate center of the village, faces a large, open, sunken area which corresponds in position to the plaza in historic Mandan villages. It might be supposed that the inhabitants had placed a replica of the sacred cedar in the center of the plaza. A circular irregularity in the sod, about 5 feet in diameter, was observed in the plaza center in 1960, but a test pit (Excavation 11) unfortunately failed to reveal post remains or artifacts other than a recent tin can lid.

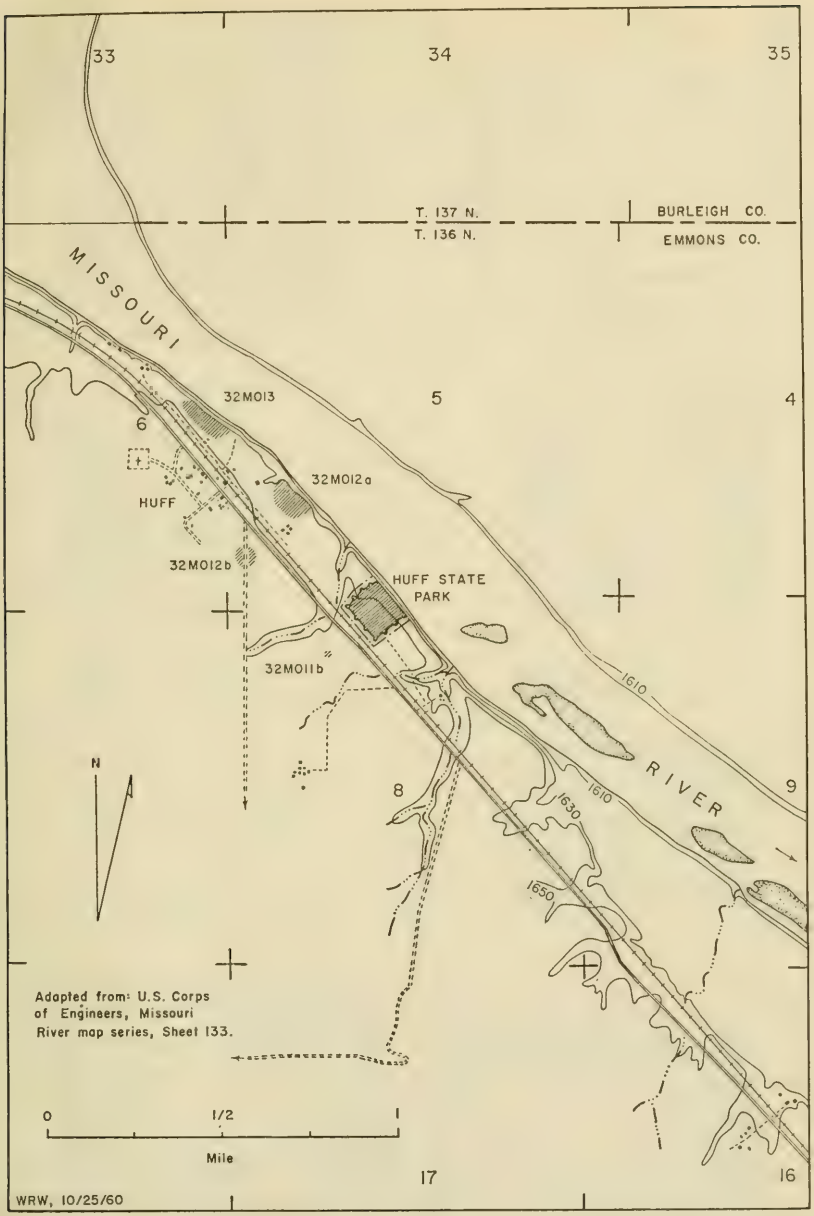
At the time of the 1960 excavations, the elevation of the village level above the river level was 43 feet. There was a narrow beach at the base of the bank at that time, but local residents informed me that it was not formerly visible except during periods of drought. The low water level in 1960 was the result of the fact that the Garrison Dam, upstream, was retaining more water than usual. A note on a map of the site made in 1905 by E. R. Steinbrueck (collections, North Dakota Historical Society; see map 3) asserts that water rose to within 20 feet of the terrace surface during the annual June rise of the Missouri River.

There is a small hill southwest of the site, across the Northern Pacific Railroad tracks and the county highway. This rise is capped by an artificial tumulus about 35 feet in diameter and 2 feet high. This mound appears to be a cemetery area, since small pieces of human bone were in the back dirt of an intruding gopher hole. A test pit (Excavation 12) in this feature in 1960 revealed no burials or artifacts. The mound is designated as 32MO11–b (map 2).

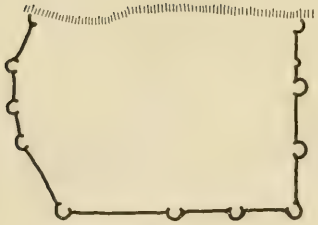
The Huff Site has long been a State park under the supervision and protection of the State Historical Society of North Dakota. The Historical Society purchased part of the site in 1910 and the remainder in 1932. A field-stone monument was erected by the Society in the west corner of the park, and the entire site was enclosed by a barbed-wire fence. State ownership has saved the village from obliteration by cultivation, and it has tended to discourage—but not prevent—amateur excavations.

HISTORICAL BACKGROUND

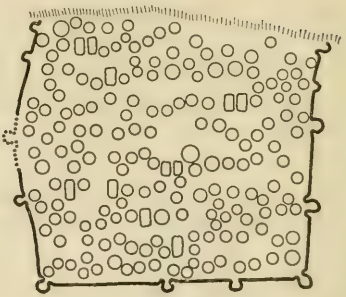
There are a number of manuscript maps and notes in the State Historical Society of North Dakota collections relevant to the developing interest in and knowledge of the Huff Site by North Dakota amateur and professional archeologists. A review of them should prove interesting to those concerned with the history of archeology in North Dakota. The first such map was made in 1905 by Emil R. Steinbrueck, a former resident of Mandan and once employed by the Society. His 1905 map, labeled "Arikara Fort" (map 3, *a*) is essentially a plat of the fortification system. It does not include



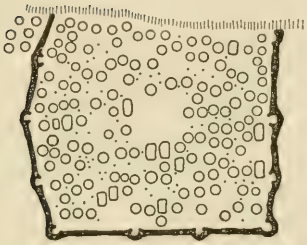
Map 2.—General area of the Huff Site (32MO11) and nearby sites.



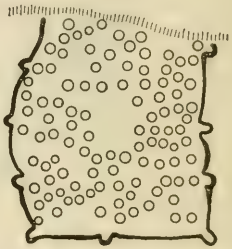
a
Steinbrueck 1905



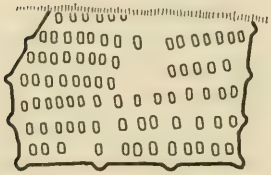
b
Steinbrueck 1908



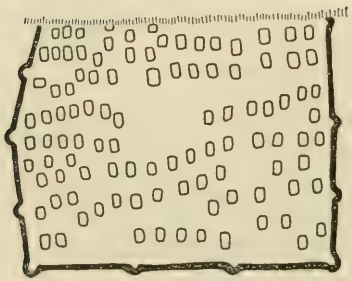
c
Stout & Steinbrueck 1908



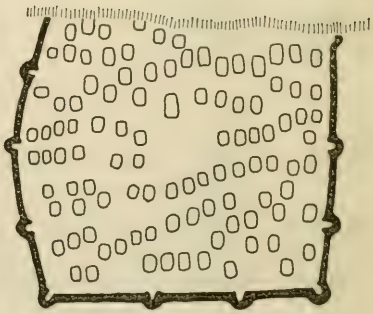
d
Will & Spinden 1919



e
Hecker 1939



f
Howard 1959



g
Wood 1960

WRW, 3/23/62

house depressions, although marginal notations on the map include an estimate of 130 houses.

Steinbrueck made a second map in 1908 (map 3, *b*), again labeled "Arikara Fort." This sketch map shows 182 houses inside the ditch, a considerable increase over the 130 houses enumerated 3 years earlier. Eleven of the houses are depicted as long-rectangular, and the rest of them as circular. It is interesting that both this map and the 1905 Steinbrueck map show 11 bastions. Subsequent maps show only 10 of them, although there seems to have been no appreciable erosion along the river bank since 1905. Another feature which occurs only on these two maps is a miniature bastionlike protrusion between Bastions A and B; no other observer has noticed such a feature.

Between June 29 and July 1, 1908, Steinbrueck returned to Huff accompanied by A. B. Stout. There are several copies of a map they prepared at that time (map 3, *c*). Since Stout was a professional surveyor, this map and others prepared by him of local sites deserve careful consideration. This map is an improvement over the 1908 Steinbrueck in several respects. It shows 144 houses, a number more closely approximating the 103 houses on the 1959 and 1960 field maps (map 3, *f*, *g*). Six of their houses, north of the ditch, were checked by Thad. Hecker in 1939, and his fieldnotes state that excavation proved them to be natural depressions. Of the 144 houses, 12 are rectangular, and notes accompanying the map state that several others appeared less plainly rectangular, and three of these were plotted as circular. Stout also made extensive notes on the village, measuring the "diameters" of the houses, and prepared sketch maps of 9 of the 10 bastions. He reported that test pits in two of the rectangular houses uncovered fireplaces near their southwestern ends.

A later map of the site was based on fieldwork in 1919 by George F. Will and Herbert J. Spinden, and was published in 1924 (Will, 1924 a, fig. 12). This map (map 3, *d*) shows 102 houses, all of them circular and inside the ditch. The 1959 and 1960 field maps nearly agree with this map in the number of houses, although I have not been successful in correlating them.

Another map was prepared in 1939 by Thad. Hecker from an aerial photograph (illustrated as pl. 1, *a*) and a "surface check of the village" (Will and Hecker, 1944, p. 95, pl. 2, *bottom*). The 84 houses on his map (map 3, *e*) are arranged in lanes; it is this map which has fostered the myth that the houses at Huff were in "streets." The

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MAP 3.—Resume of Huff Site cartography, 1905–60 (various scales).

most casual comparison of the vertical aerial photograph taken in 1960 with the Steinbrueck, Will and Spinden, and Hecker maps can only lead to the conclusion that they are sketch maps drawn without the benefit of any precise ground-level controls. The next published map (Howard, 1962 b) of Huff (map 3, *f*) is a carefully prepared plane-table survey plat, and the present map (map 3, *g*) was prepared from the vertical aerial photograph taken in 1960.

This resume of the history of Huff cartography is particularly interesting in revealing the extent to which preconceptions effect the perception of field data. The first long-rectangular house excavated in North Dakota was House 5 at Huff, dug by Thad. Hecker in 1938–39. Prior to that time there was no hint in the literature of villages composed solely of long-rectangular houses. The local historic earth lodges were circular and, despite the large number of sites available of long-rectangular houses, field workers persisted in "seeing" the circular houses they expected to find.

It is probable that the 1960 field map of Huff reflects a bias for long-rectangular houses, but each individual house was carefully observed at different times of the day for either alternative. From the surface, only House 9 appeared to be circular or square (depending upon the time of day and the angle of sunlight), but unfortunately the excavation of this depression did not reveal a satisfactory house pattern. A glance at the site map will reveal a number of houses which might either be square houses or abbreviated long-rectangular houses, since floor plans are not precisely reflected by surface indications. Perhaps some houses were missed because they were not clearly defined, but I do not feel that more than four of five of them could be added in the space available. Surface indications of houses were generally quite distinct, except in the northern part of the site east of House 13. The open spaces between the visible houses inside the ditch were carefully checked, both on the ground and on the aerial photograph, but these areas were conspicuous in their lack of relief.

EXCAVATIONS

EXCAVATION METHODS

The 1960 field season began with an agreement between the State Historical Society and the National Park Service that the archeologist was to restrict salvage operations within a 100-foot strip of the site adjacent to the river bank. When the Oahe Reservoir reaches full pool level it is anticipated that wave action from the lake will cut into the loosely consolidated sediments underlying the site. Ultimately, the entire site could slump into the reservoir and be lost. The U.S. Army Corps of Engineers, by which the Oahe Dam is being built,

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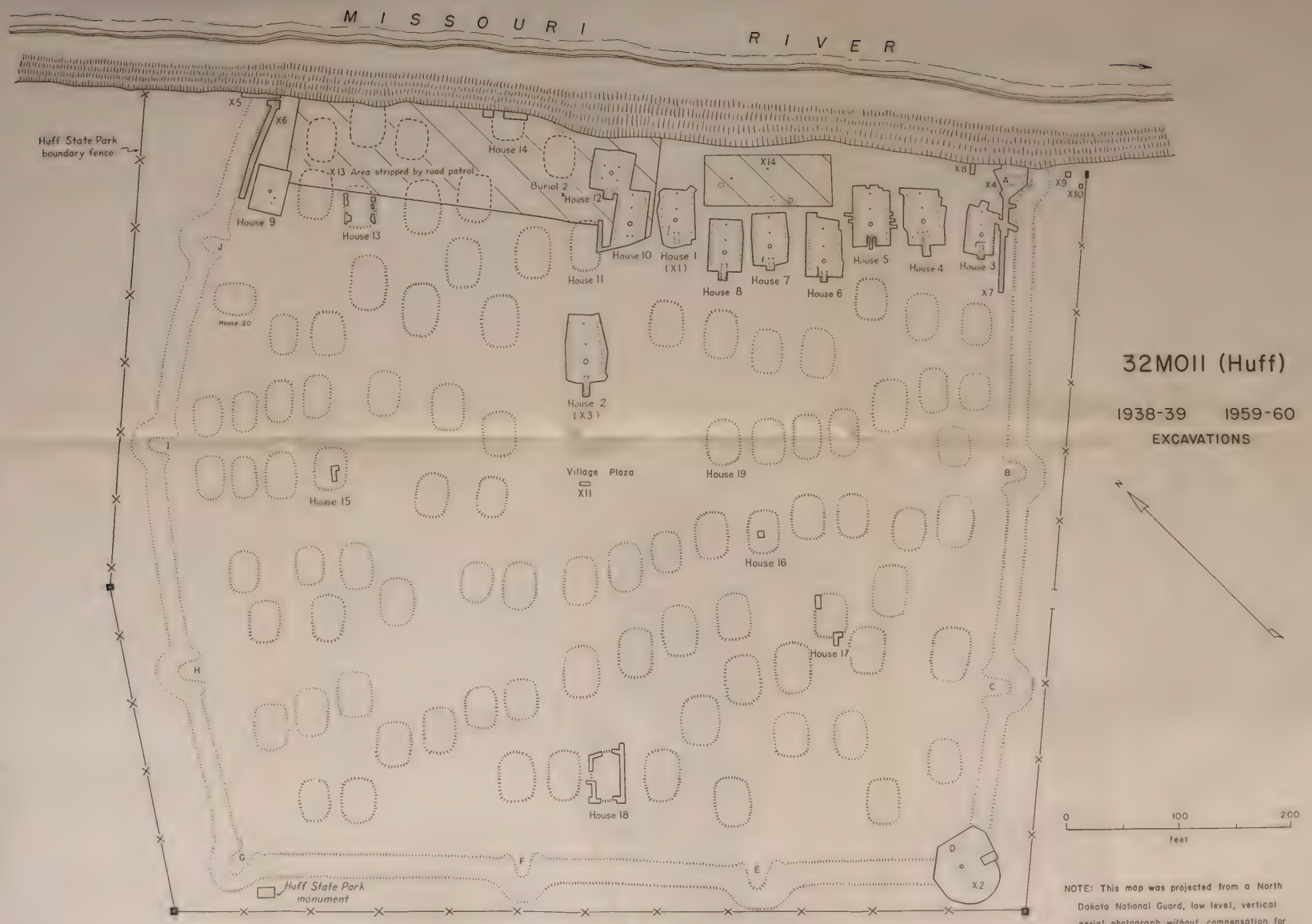


MAP 4.—Map of the Huff Site (32MO11) showing the 1938-39 and the 1959-60 excavations.

has plans to stabilize the bank here by an emplacement of rip-rap. In order to do so, and to preserve the rest of the site, a 100-foot strip of the village adjacent to the riverbank will be beveled down by earth-moving equipment. This work, I understand, has now been completed.

James H. Howard opened five excavation units at Huff in 1959. His excavations were as follows: Excavation 1 was House 1, Excavation 2 was Bastion D, Excavation 3 was House 2, and Excavation 4 was Bastion A. Houses were not given excavation numbers in 1960, but were numbered in sequence, continuing where Howard left off in 1959. Thus, the 1960 field season began with House 3 and continued through House 12. Excavations that did not contain houses continued Howard's sequence of excavation units; thus, the 1960 field season began work in Excavation 5 and continued through Excavation 14. The house excavated by Thad. Hecker in 1938–39 was redesignated House 5 (Hecker referred to it as House 25). The various excavations at Huff by the three successive field parties are summarized in table 1.

TABLE 1.—*Excavation units identified*

Identification	Excavation No.	Year
House 1	1	1959
Bastion D	2	1959
House 2	3	1959
Bastion A	4	1959
Houses 3, 4	----------	1960
House 5	----------	1938–39
Houses 6–12	----------	1960
Fortification ditch profile	5	1960
Northwest palisade line	6	1960
Southeast palisade line	7	1960
Test pit (east of House 4)	8	1960
Garbage pit (outside ditch)	9	1960
Latrine pit (outside ditch)	10	1960
Test pit (plaza area)	11	1960
Mound test pit (outside village: 32M011–b)	12	1960
Area stripped by road patrol	13	1960
Do	14	1960

The first work done in 1960 after establishing the field camp was cutting a cross section of the fortification ditch (Excavation 5) along the riverbank at the north side of the site. Subsequently, 75 feet of the palisade was exposed in Excavation 6 west of this cross section, and about 85 feet of the palisade was unearthed on the south side of the site in Excavation 7, commencing with the line of postholes exposed by Howard in Bastion A in Excavation 4. The technique consisted of cross trenching the inner side of the ditch and earth ridge. When postholes were found, a trench 4 feet wide was cut to a depth of 0.8 foot, at which depth an almost continuous line of postholes was observed. The soil was still mixed at the bottom of the excavation, but since the purpose of this work was to determine the palisade line, work was halted when this line was defined.

Houses 3 and 4 were then respectively cross trenched and test-pitted. When floor level was established, excavation walls were extended until both sidewalls were defined. The wall postholes were then followed out to their ends, and the house floor was cleared. A trench to the southwest was required to expose details of the entrance passage. House fill was essentially a structureless, aeolian silt and sand deposit that was sterile except for a few artifacts and some detritus which had been brought from deeper levels and redeposited by burrowing animals.

House floors were marked by artifacts lying horizontally in the soil, and by the deposits of charcoal and ash on the floors of houses which had been destroyed by fire. The house fill was removed by spading, but the soil immediately above the floor was removed by careful horizontal scraping with shovels. Fireplaces and other features were cored with trowels. Pit fill was screened only when large numbers of small artifacts occurred or when the fill was ashy enough to presume that such perishables as corn might be recovered; none of the house fill was screened. Four weeks were required to excavate Houses 3 and 4, approximately two weeks for each house. At least half of this time was spent removing the extraordinarily tough sod and the sterile overburden.

In order to facilitate the removal of overburden, farm equipment was used to strip the surfaces of Houses 6, 7, and 8. The ground was first plowed, then the loose sod and soil was removed with a front-end loader on the tractor. This expediency removed most of the overburden and left about half a foot of fill above the floors. These three houses were then excavated by conventional handtools as described above. Three weeks were spent in the excavation of these houses, approximately one week per house; that is, excavation time was halved by the use of power equipment. A search was made for houses and other features northeast of these three houses with a small road patrol, but with essentially negative results (Excavation 14).

By this time the summer budget was nearly exhausted, and a road patrol was employed to strip the overburden from the rest of the unexcavated houses within the 100-foot strip along the river. Through the cooperation of the North Dakota National Guard, a road patrol was made available and House 9 was stripped of soil to a point a few tenths of a foot below the floor. The crew excavated this house while the road patrol was cutting and clearing Excavation 13. The plan at this time was to continue clearing house floors in a line with those already excavated. House 10 was subsequently exposed and the wall of House 11 delimited. We hoped to strip most of the floors of houses exposed by the road patrol, map their postholes, and spot-test cache pits for a minimal sample. This plan was abandoned with

the discovery of House 12. This house departed so radically from the architectural pattern seen previously in the houses that the rest of the season was devoted to its excavation. Time and money were exhausted by the time it was completed, and the site was abandoned at the end of the 10th week of the season. At this time, 11 houses had been dug, either by our party or previously, and about 10 percent of the houses at Huff had been sampled.

The excavations at Huff in 1938–39 and in 1959–60 were designed to explore and define details of (1) the dwelling and ceremonial structures, (2) the fortification system, and (3) burial customs. The results of these objectives are summarized below.

HOUSES

The floor plans of the Huff houses are rectangular. One of them (House 12) is nearly square, with four center posts, but the rest of the structures seem to be long-rectangular. These long-rectangular houses are remarkably consistent in architectural details, the differences consisting largely in size and in floor features. Table 2 gives the major dimensions and selected traits of this architectural complex.

TABLE 2.—*Dimensions of long-rectangular houses (in feet)*

	House No.									
	1	2	3	4	5	6	7	8	10	18
House length, total	50.0	69.0	38.0	54.0		48.0	48.5	57.5		
House floor, length	36.0	49.0	27.0	36.0	36.0	40.0	41.0	41.0	38.0	48.0
Entrance length	14.0	20.0	11.0	18.0		8.0	7.5	16.5		
House front width	27.0	38.0	23.0	29.5	31.0	31.0	33.0	31.0	32.0	35.0
House back width	26.0	28.0	20.0	22.0	28.0	24.0	29.0	28.0	28.0	31.0
Front/back difference	1.0	10.0	3.0	7.5	3.0	7.0	4.0	3.0	4.0	4.0
Entrance post:										
Diameter	1.0	1.0	0.8	1.0		.8	1.1	1.0	1.1	
Depth	2.2	1.3	2.0	2.7		2.4	2.8	2.0	2.9	
Center post:										
Diameter	1.0	1.5	0.7	0.9		1.4	1.1	1.1	1.0	
Depth	2.4	2.6	2.5	2.8		3.0	3.2	2.5	4.0	
End post:										
Diameter	1.4	1.5	1.1	1.1		1.3	1.1	1.0	1.1	
Depth	2.7	2.1	2.0	2.6		2.5	2.4	2.2	2.8	
Wall post:										
Diameter	0.4–0.9	0.5–1.1	0.4–0.9	0.4–0.9		0.4–0.8	0.5–0.9	05.–0.9	0.5–1.0	
Depth	0.8–1.6	0.9–1.3	0.7–1.5	0.7–2.2		0.8–2.3	0.8–2.0	1.5	0.5–1.8	
Firescreen	Yes	?	Yes	Yes	?	Yes	Yes	No	No	
Sidewalls convex	No	Yes	No	Yes	No	No	Yes	Yes	Yes	

To avoid repetition, the general characteristics of these long-rectangular houses are summarized below. The house dug by Hecker in 1938–39 is included in this summary, as well as those dug by Howard in 1959.

Shape.—Long-rectangular, the width approximating two-thirds of the house floor length. Determining the exact proportions is impractical owing to excurvature in the wall line and to variation in house width.

Dimensions.—Length (measured from the interior entrance posts to the end post) ranges from 27 to 49 feet. Width is usually different at the house front, center, and back, with the front ranging from 23 to 38 feet, and the back, from 20 to 29 feet (see table 2).

House pit walls.—Unfaced native soil. Houses were built over pits dug 1.0 to 1.2 feet into the former ground level. As much as 1.5 feet of aeolian sand and silt deposits covered the house floors, although overburden on level parts of the site area outside the houses was only about 1 foot deep.

Floor.—Tramped earth, the center depressed, and sloping up gently toward the sides and ends.

Roof supports.—There were two large interior entrance posts; one large post in the house midline, offset toward the back wall; and a large end post. The entrance and the end posts were consistently about the same size and, except for House 1, the center post was always the largest and deepest of the group.

These four posts are presumed to have provided support for a central ridge pole (see fig. 13, p. 103, for a speculative reconstruction). Wall posts were confined to the sidewalls. In most instances they extended a few feet beyond the house front (as marked by the interior entrance posts), but rarely beyond the end post. There was considerable variation in their size, and they were often irregularly spaced. House walls were usually gently convex.

Entrance passage.—All entrys were directed toward the southwest, away from the river. The passage was composed of two sets of two posts, which provided the frame for an elongated entryway, the sides of which were enclosed by small posts, generally set into shallow trenches somewhat shorter than the entry length. The length of the entry was independent of the house length, and was 7.5 to 20 feet long and 2.5 to 6 feet wide. A ramp or step of undisturbed native soil extended into the house pit, terminating at the interior entrance posts.

Firescreens.—An L-shaped trench in House 3 seems to be part of a firescreen which necessitated a turn to the right on entering the house. Parts of others were present in other houses, often containing the butts of small poles.

Fireplaces.—The primary fireplace was in the midline of the house between the entrance and the center post. It was a basin-shaped pit about 3 feet in diameter and 0.6 of a foot deep, filled with hard ash and charcoal, and floored with burned earth. Two houses, 3 and 6, had clay-lined hearths. Most of them contained pottery sherds, burned bone, and fragmentary household detritus. House 1 was atypical in lacking a central, primary fireplace.

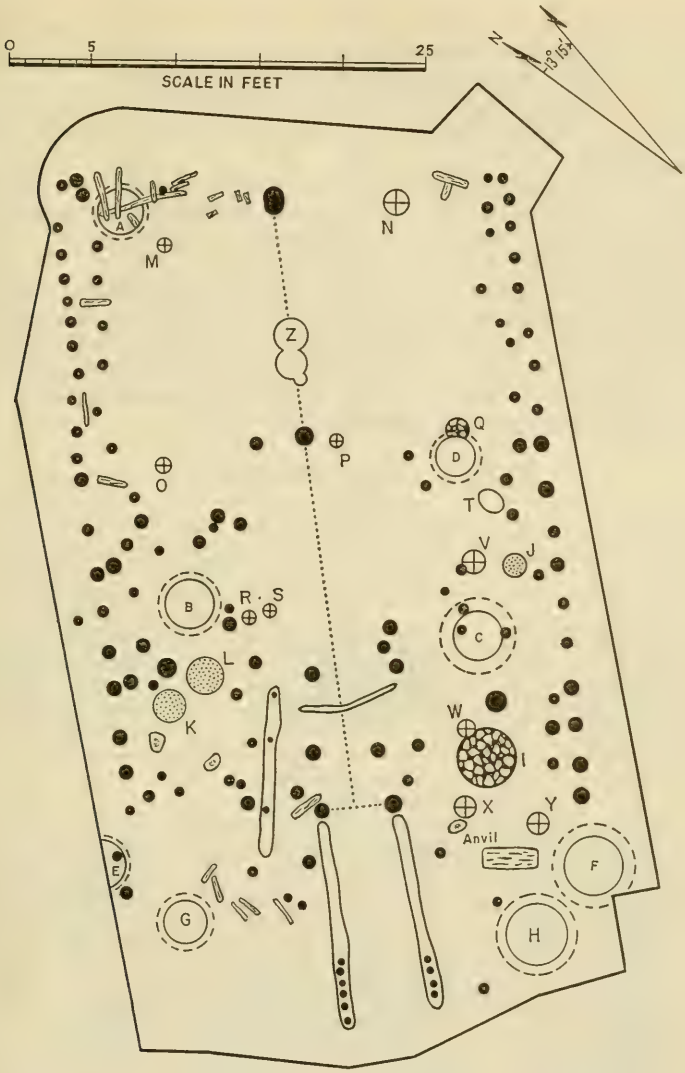
Other.—Houses 1, 2, 4, 5, 7, 8, and 11 had been burned. Their floors were scattered with ash and charcoal and occasional charred posts from the house superstructure. Most of the posts appeared to be of oak or cedar. Many of them were in excellent condition and these were saved for Carbon-14 determinations and tree-ring analysis. The post bases were charred, apparently the trees having been felled by charring the trunk rather than by chopping.

The ridge of earth along the house sidewalls, shown in the contour map of House 19 (see map 15), suggests that sidewalls of wattle and daub were banked with earth. House ends were apparently not banked, although the house fronts were cut steeply into the native soil. There were variations in other features in the houses, and these variations and individual features are discussed in the descriptions below.

House 1 (map 5):

Shape: Long-rectangular.

Floor: There was a large number of auxiliary posts on the house floor. The house had burned, and charred timbers and ash littered the floor.



HOUSE 1

Excavation limit	Posthole
Fireplace	Posthole, braced
Undercut pit	Posthole inclined in direction shown
Basin-shaped pit	Shallow trench
Cylindrical pit	Charred timber
Unexcavated pit	Probable position of roof beams
Stones	

Map 5.—Plan of House 1.

Entrance: It was lined by two parallel trenches 11.5 and 12.5 feet long, 0.7 foot wide and 0.5 foot deep, which contained the butts of poles 0.2 to 0.3 foot in diameter. The outer postholes of the entry were not located.

Fireplaces: There was no primary fireplace between the firescreen and the center post, as in all of the other houses, but there were several other fireplaces along the sidewalls.

Firescreen: Two separate trenches are interpreted as parts of a firescreen. One of them was 10 feet long, 0.8 foot wide, and 0.5 foot deep; it contained the butts of poles 0.3 foot in diameter. The other trench, 6 feet long, 0.5 foot wide, and 0.4 foot deep, lacked any trace of post butts.

Comments: The house had burned, and a number of posts were saved for tree-ring analysis. Six cache pits (Features A–F) in the floor of this structure, which had been excavated by Howard in 1959, were noted and dug in 1960, at which time the house was remapped. Howard's features are included and identified in table 3. See Howard (1962 b, pp. 11–13, fig. 1) for additional discussion of this house, which is identified as a dwelling unit.

TABLE 3.—*House 1 floor features*

EXCAVATED IN 1960

Feature	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
A	Bell-shaped pit	Orifice, 2.8; base, 3.6	2.5	Mixed earth; artifacts.
B	do	Orifice, 2.5; base, 3.0	2.0	Do.
C	do	Orifice, 3.0; base, 4.5	4.5	Mixed earth; refuse.
D	do	Orifice, 3.0; base, 4.0	3.5	Mixed earth; artifacts.
E	do	Orifice, 3.0; base, 3.5	2.0	Do.
F	do	Orifice, 3.8; base, 4.9	2.6	Ashy, mixed earth; artifacts.

EXCAVATED IN 1959
(Data from Howard, 1962 b)

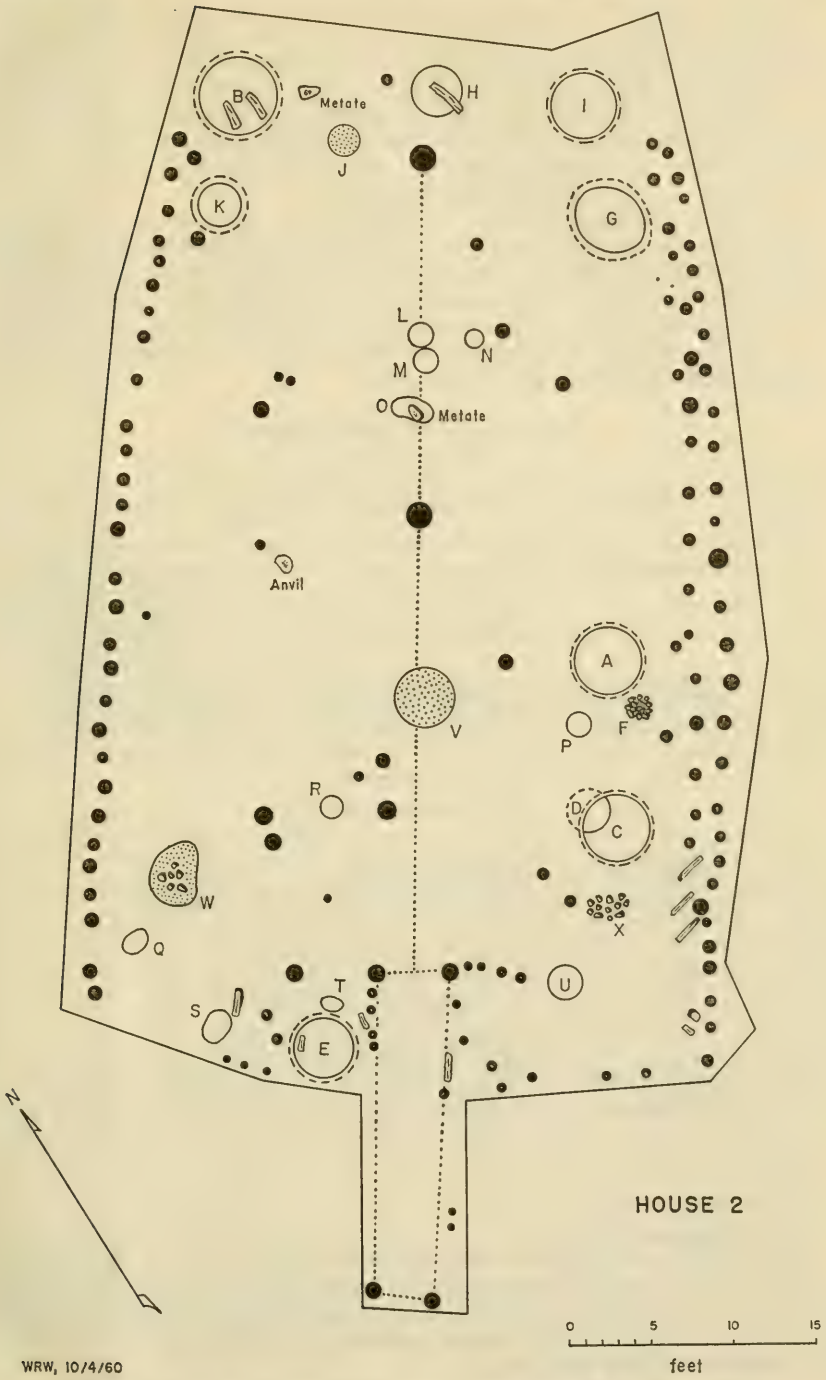
G	Bell-shaped pit	Orifice, 2.5; base, 3.0		Mixed earth.
H	do	Orifice, 3.7; base, 4.8		Do.
I	Rock-filled basin	3.6		Stone.
J	Fireplace	1.9		Burned earth.
K	do	1.9		Do.
L	do	2.3		Do.
M	Cylindrical pit	.8		Mixed earth.
N	do	1.5		Do.
O	do	1.0		Do.
P	do	.8		Do.
Q	Stone-filled basin	.8		Stone.
R	Cylindrical pit	.8		Mixed earth.
S	do	.8		Do.
T	Basin-shaped pit	1.2×1.6		Do.
U	Not used			
V	Cylindrical pit	1.4		Do.
W	do	1.1		Do.
X	do	1.1		Do.
Y	do	1.3		Do.
Z	Interconnected basin-shaped pits.	2.0×4.0		Do.

HOUSE 2 (map 6)

Shape: Long-rectangular.

Floor: Contained a few auxiliary postholes and a few other features, including seven bell-shaped cache pits.

Entrance: Extended to the southwest for a distance of 20 feet. A number of post molds, 0.4 foot in diameter, lined the passage, but they were not set in trenches.



MAP 6.—Plan of House 2, the ceremonial lodge (after Howard).

Fireplaces: The primary fireplace was 3.5 feet wide and 0.6 foot deep. There was one surface hearth near the back of the house 1.8 feet wide, and one fireplace, containing burned stones and ash, north of the entrance; it measured 3.8 by 4.7 feet in diameter, and was 0.4 of a foot deep. There were three concentrations of fire-cracked rocks elsewhere on the floor, perhaps the remains of sweat lodges; one of them overlay the orifice of Feature A, a bell-shaped pit. One auxiliary fireplace overlay the mouth of Feature C, also a bell-shaped pit.

Firescreen: No trace of a firescreen was found.

Other: This house had burned. This structure is interpreted as the village ceremonial lodge for two reasons: it is larger than the other houses, and it is prominently placed with the entrance facing the center of the village plaza. Household detritus in the bell-shaped pits in its floor, however, suggest that it was a domestic dwelling. This house was dug by Howard in 1959 (1962 b, pp. 11–13, fig. 5). Seven additional pits (Features A–G) were excavated in this house in 1960 when the house was remapped.

TABLE 4.—*House 2 floor features* [1]

EXCAVATED IN 1960

Feature	Identification	Maximum diameter	Maximum depth	Contents and comments
A	Bell-shaped pit	Orifice, 4.1; base, 4.5	4.2	Mixed earth; artifacts. Underlies sweat lodge.
B	do	Orifice, 4.8; base, 5.4	4.5	Mixed earth; artifacts, including Example A rim.
C	do	Orifice, 4.0; base, 4.5	2.5	Mixed earth; artifacts; pit D in floor. Mouth covered by fireplace.
D	Cylindrical pit	2.4	1.5	Mixed earth; pottery.
E	Bell-shaped pit	Orifice, 3.5; base, 4.0	3.5	Mixed earth; artifacts.
F	Basin-shaped pit	2.3	.4	Ash, fire-cracked stone.
G	Bell-shaped pit	Orifice, 4.7; base, 5.7	3.1	Mixed earth; refuse.

EXCAVATED IN 1959

(*Data from Howard, 1962 b*)

H	Basin-shaped pit	3.1		Mixed earth.
I	Bell-shaped pit	Orifice, 3.9; base, 4.5		Do.
J	Fireplace	1.9		Burned earth.
K	Bell-shaped pit	Orifice, 2.6; base, 3.5		Mixed earth.
L	Basin-shaped pit	1.5		Do.
M	do	1.5		Do.
N	do	1.1		Do.
O	do	1.5×2.6		Do.
P	do	1.5		Do.
Q	do	1.2×1.8		Do.
R	do	1.3		Do.
S	do	1.5×2.1		Do.
T	do	0.8×1.3		Do.
U	do	2.0		Do.
V	Central fireplace	3.7		Burned earth.
W	Fireplace	2.3×4.0		Burned earth, stone.
X	Concentration of stone	1.6×2.5		Stone.

[1] In feet and tenths of a foot.

HOUSE 3 (map 7; pl. 3, *b*)

Shape: Long-rectangular.

Floor: The floor of this house was difficult to determine because the structure had not burned. The floor was littered with large quantities of bison scapula hoes, broken pottery vessels, an L-shaped antler scraper haft, and other fragmentary and intact household debris. It was the richest of the houses dug in 1960. Auxiliary posts in the floor were rare.

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MAP 7.—Plan of House 3, the southeast fortification ditch and Bastion A

Entrance: It was lined by two parallel trenches 8 and 8.5 feet long, 0.5 foot wide, and 0.4 foot deep. These trenches contained the closely spaced molds of posts averaging 0.3 foot in diameter.

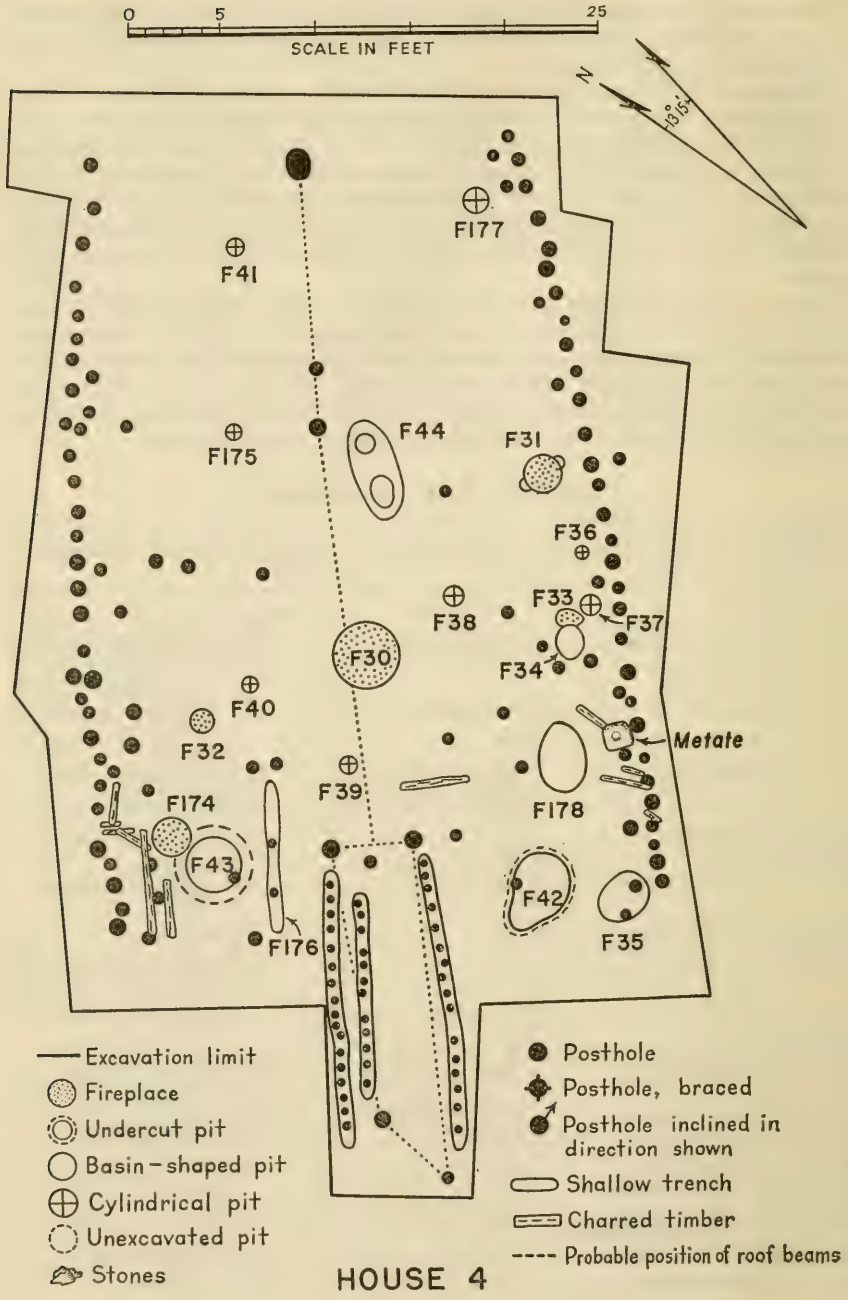
Fireplaces: The primary fireplace differed from those in most of the other houses in being lined with a dense, yellow clay hardened by the heat of the fire; a clay lining was found elsewhere only in House 6. There were five auxiliary fireplaces.

Firescreen: Feature 28 is of primary interest because of its completeness. It is L-shaped in plan, and U-shaped in cross section. It contained the remains of no posts, and if its identification is correct the screen itself was composed of a perishable material. This feature yielded a number of pottery sherds and other debris.

Other: An old excavation, presumably made by Thad. Hecker, extended from the wall posts on the west side to a point near Feature 20. This pit barely missed a fragmented bison skull, stained with red ocher, lying on the floor beside Feature 20. This skull may be part of a household shrine. The structure had not burned, and the floor was determined by the level of floor features and by artifacts lying horizontally in the soil. The house is interpreted as a dwelling unit.

TABLE 5.—*House 3 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
1	Primary fireplace	4.0	0.8	Lined with yellow clay.
2	Bell-shaped pit	Orifice, 2.5; base, 3.5	3.5	Intersects with F6 and F7.
3	do	Orifice, 3.0; base, 4.0	4.0	Walls and floor lined with mixed earth; fill a hard, sterile, yellow clay.
4	do	Orifice, 3.2; base, 3.5	3.0	Mixed earth; artifacts; *behind house.*
5	Auxiliary fireplace	2.5	.3	F16 and F24 intersect edges.
6	Bell-shaped pit	Orifice, 3.0; base, 4.0	3.0	Intersects with F2 and F8.
7	do	Orifice, 3.7; base, 4.8	4.1	Intersects with F2.
8	do	Orifice, 3.2; base, 4.2	3.0	Intersects with F6 and F23.
9	Cylindrical pit	.7	1.6	Mixed earth, artifacts.
10	do	.8	1.3	Do.
11	do	1.0	1.1	Mixed earth.
12	Auxiliary fireplace	2.5	.5	Ash, charcoal, burned earth.
13	do	2.5	.5	Do.
14	Cylindrical pit	1.0	.5	Mixed earth.
15	do	.8	.6	Do.
16	do	1.0	1.5	Granite stones, with bone scrap above and below stones.
17	Auxiliary fireplace	1.5	.4	Mixed earth; pottery sherds.
18	do	1.2	.4	Ash, charcoal.
19	Cylindrical pit	1.0	1.6	Mixed earth.
20	Bell-shaped pit	Orifice, 3.4; base, 4.8	3.2	Extremely hard fill; artifacts abundant.
21	do	Orifice, 3.0; base, 4.0	2.4	Extremely hard fill.
22	Basin-shaped pit	1.0	.3	Mixed earth; bone.
23	do	4.1×6.2	2.2	Mixed earth; pottery sherds.
24	Cylindrical pit	1.0	.5	Mixed earth; artifacts.
25	Unexcavated pit	2.7		Mixed earth.
26	do	2.5		*Behind house.*
27	Complex of three overlapping cylindrical pits.	1.8	2.0	Mixed earth; artifacts.
28	Firescreen trench	.7	1.1	Mixed earth; pottery sherds.
29	Cylindrical pit	.5	1.3	Mixed earth.



Map 8.—Plan of House 4.

HOUSE 4 (map 8)

Shape: Long-rectangular.

Floor: The floor was well-defined, particularly in the southwest corner, where it was covered with a deep layer of heavy ash and burned timbers. The tops of wall posts were only a few tenths of a foot below the ground surface in this corner. They had been preserved by charring, and projected well above the floor.

Entrance: The outer posts were irregularly spaced, and both sides of the passage were lined with small poles set in shallow, parallel trenches 15 and 16 feet long. A third (and extraneous) trench, 11 feet long, 0.6 foot wide, and 0.5 foot deep was in the entryway; it was lined with closely spaced posts 0.4 to 0.5 foot in diameter.

Fireplaces: The primary fireplace was in the house midline, between the entrance and the center post. A large number of pottery sherds were in and around this feature, and at least four or five restorable vessels were crushed nearby when the house collapsed. There were four auxiliary fireplaces in the house.

Firescreen: A trench, parallel to the midline of the house, and north of the entrance, may be part of a firescreen. It contained the butts of two posts 0.4 foot and 0.5 foot in diameter.

Other: Before excavation, an irregular pit was cleared that extended from Feature 40 to the northwest house wall. It was probably the work of Thad. Hecker. A large sandstone metate and a mano were along the southeast wall, both of them blackened and fire-cracked. Grooved ironstone nodules, grooved mauls, and other heavy ground stone tools were especially plentiful along the sidewalls, near the postholes. Most of them, like the mano and metate, showed the effect of the fire which had destroyed the house. This structure is probably a dwelling unit.

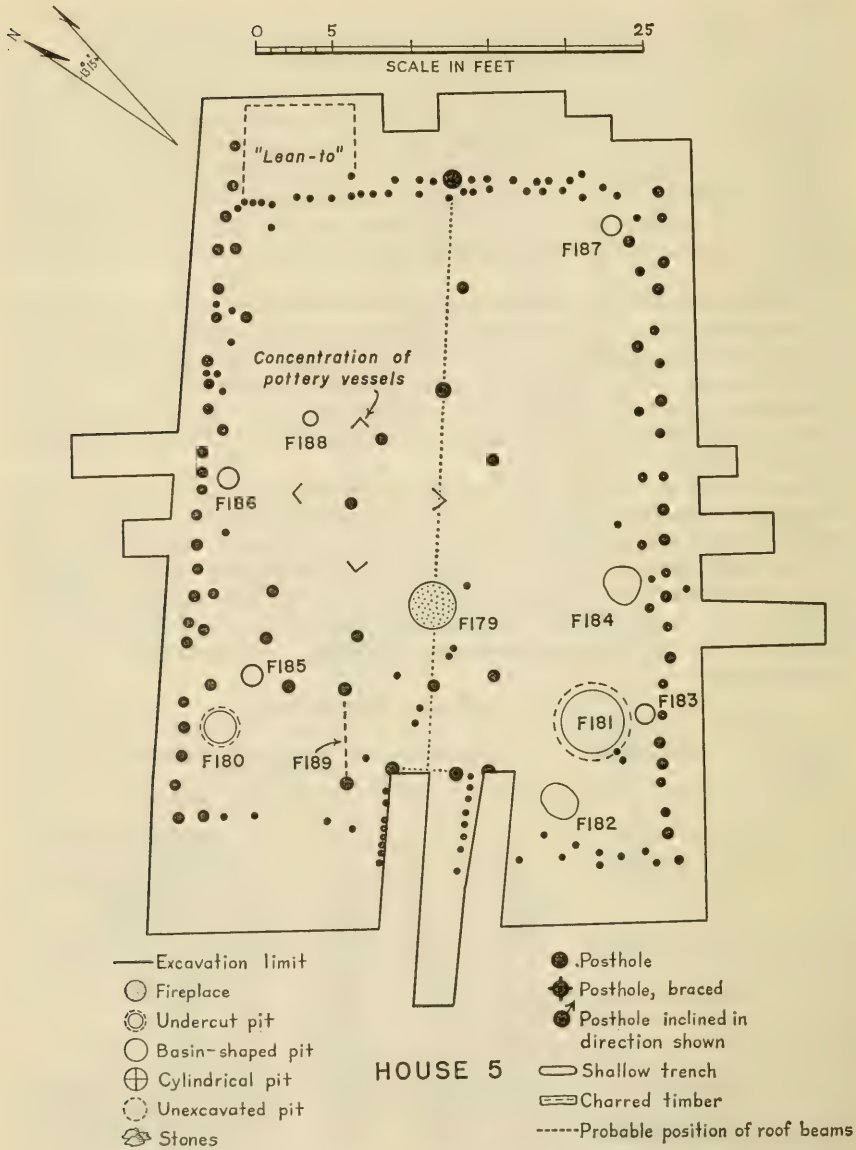
TABLE 6.—*House 4 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
30	Primary fireplace	3.5	0.9	Ash, charcoal; pottery sherds.
31	Auxiliary fireplace	2.0	.4	Ash, charcoal; small cylindrical pits intersect opposing sides.
32	do	1.3	.3	Ash, charcoal.
33	do	0.8	.2	Intersects with F34.
34	Basin-shaped pit	2.0	.7	Mixed earth; artifacts.
35	do	2.9 × 3.1	1.5	Mixed earth, ash; 2 postholes.
36	Cylindrical pit	0.6	.3	Mixed earth.
37	do	1.1	1.1	Do.
38	do	1.0	.6	Do.
39	do	1.0	.9	Mixed earth; bone.
40	do	0.9	.6	Mixed earth.
41	do	0.9	.9	Do.
42	Bell-shaped pit	Orifice, 5.6; base, 6.2	6.2	Mixed earth; one posthole.
43	do	Orifice, 3.1; base, 4.2	4.1	Mixed earth; artifacts.
44	Irregularly shaped pit	8.5 × 6.0	2.5	Two adjoining pits in floor.
174	Auxiliary fireplace	2.0	.7	Ash, charcoal.
175	Cylindrical pit	0.8	.5	Mixed earth.
176	Firescreen trench	0.7 × 8.0	.5	Mixed earth; post butts; artifacts.
177	Cylindrical pit	1.4	1.1	Mixed earth; charcoal.
178	Basin-shaped pit	2.4 × 3.8	1.2	Mixed earth.

HOUSE 5 (map 9)

Shape: Long-rectangular.

Comments: Thad. C. Hecker, as a representative of the State Historical Society, conducted work at this house in October and November of 1938, completing this work sometime in 1939. The following discussion of House 5 is abstracted



MAP 9.—Plan of House 5.

from his field notes dated January, 1939, and August 12, 1939, and from his published account (Will and Hecker, 1944, pp. 19–23, 95). Instructed by George F. Will to select a house at Huff for excavation, Hecker began work on one tested earlier in the summer of 1939 by students from the Columbia University field party then working at On-a-Slant Village (32MO26). Hecker's examination of their trench revealed 6 to 8 inches of windblown sediments overlying 6 to 8 inches of mixed earth.

Floor: The well-packed floor was distinguished by ash and other detritus, and it sloped down gently toward the house center. The structure had burned, as shown by charred wall posts, roof beams, and ash on the floor. The wall posts, 6 to 8 inches in diameter, were slightly staggered, alternate posts having a slight slant to the interior and exterior. There was one large end post. Scattered across the floor were timbers or impressions of timbers from the superstructure, most of them lying approximately at right angles to the side and end posts. He traced a number of such timbers for lengths up to 10 feet.

Hecker mentions two rows of "stakes," 2 to 3 inches in diameter, that extended across the back wall of the house. He also illustrates them across the front end. The 1959 and 1960 excavations in eight similar houses revealed no similar arrangement—with the posts set in holes in such straight lines. Traces of posts in the house ends were in fact quite rare, generally consisting only of traces of wood, which probably represent the butts of poles which rested on the former floor level, rather than in holes.

The floor did not extend beyond the end wall posts, and Hecker suggests that the walls were vertical, rather than slanting. Trenches cut beyond the sidewalls showed that the earth "piled against the walls sloped up from approximately 6 feet out from the wall at ground level." There was no indication of clay along the sides, and he rejected the possibility of wattle-and-daub walls, a possibility accepted by Howard (1962 b, p. 11) and myself on the basis of our work at Huff. Hecker did not find the large exterior entrance posts, but the passage extended at least 6 feet to the southwest. He states that the passage was "easily traced," but that there were no indications of posts more than 6 feet beyond the interior entrance posts.

Features: There were five shallow, oval pits on the floor, Features 182 to 186. They were about 30×40 inches in diameter, and 1 foot deep. "One pit was full of granite rocks and ashes; no doubt the granite was being burnt to be used for pottery tempering." The other four holes were filled with ash and refuse. Hecker mentions three other pits, about 18 inches in diameter and a foot deep, but shows the location of only one of them, Feature 187. "The use of two are indeterminate; they are near the east wall." The small pit (Feature 188) near the concentration of pottery vessels north of the fireplace he incautiously but definitely identifies as the site of a "wooden mortar."

In addition to these features, dug in 1938, he dug two other pits in 1939. One of them, Feature 180, was 2.5 feet in diameter and 2 feet deep. It is shown as a bell-shaped pit on the house map prepared for this study since it was of "the usual type used for storage." The other and larger pit, Feature 181, was 5 feet deep and 5 feet in diameter at its base. Among other artifacts, it contains a small pipe Hecker identified as catlinite. I have questioned the identification as catlinite since there is no other record of this material in the site, and he may have confused the dense scoria, common enough here, with catlinite. Elsewhere, also, he speaks of catlinite beads, which strongly suggest the scoria beads found in 1960. The primary fireplace, Feature 179, was 3 feet in diameter, but he does not specify depth. Between the fireplace and Feature 188 was an area about 6×8 feet where "no less than 20 cooking pots were left standing. . . ." He states that small pits were scooped out in the floor in which to set them. They were badly shattered and were not recovered; see his comments in Will and Hecker (1944, p. 22). He did recover one nearly intact vessel which was inverted in a shallow pit filled with earth and ash (pl. 6, *c*).

He also remarks that the "house had a small room or lean-to on the outside of the [back] wall of the lodge. This small room had a floor space of 5 by 7 feet.

No post or stake holes showed around this small floor space . . . . The floor sloped slightly towards the lodge and was sharply defined level [sic] and covered with the usual floor debris. . . ." Excavations in 1959 and 1960 revealed no further instances of such features in other houses.

Comments: The map prepared for this report (map 4) includes this house in its correct relationship to the rest of the dwellings. This was done by relocating the large support posts and the primary fireplace in 1960. To those familiar with Huff data, it is obvious that the house has been redrawn (map 9) from Hecker's published map (ibid., pl. 6). This new map is in fact an interpretation of Hecker's map, based on his field map and notes and on comparisons with the houses dug in 1959 and 1960. This map was prepared to show how closely Hecker's work was verified by later work, and to show that, despite idiosyncracies in his cartography, it closely conforms to the floor patterns of the rest of the long-rectangular houses. The dotted line connecting two postholes on his published map, previously unidentified, is in the position of the firescreens noted in other houses. Hecker has often been belabored by local archeologists, but this has been done without recourse to his field notes and maps. His excavation technique, questionable in many respects, resulted in generally precise excavation maps—even if they do not always show all the details we might wish.

House 6 (map 10; pl. 4, *a*)

Shape: Long-rectangular.

Floor: This structure revealed fewer auxiliary postholes and floor features than any of the other houses except House 5. A unique feature of the walls of this house is the fact that many of the postholes were inclined toward the house interior. These inclined posts were irregularly placed among otherwise vertical postholes at angles between 8 and 30 degrees. This arrangement is something like that reported by Hecker in House 5, although none of the posts in House 6 were inclined outward.

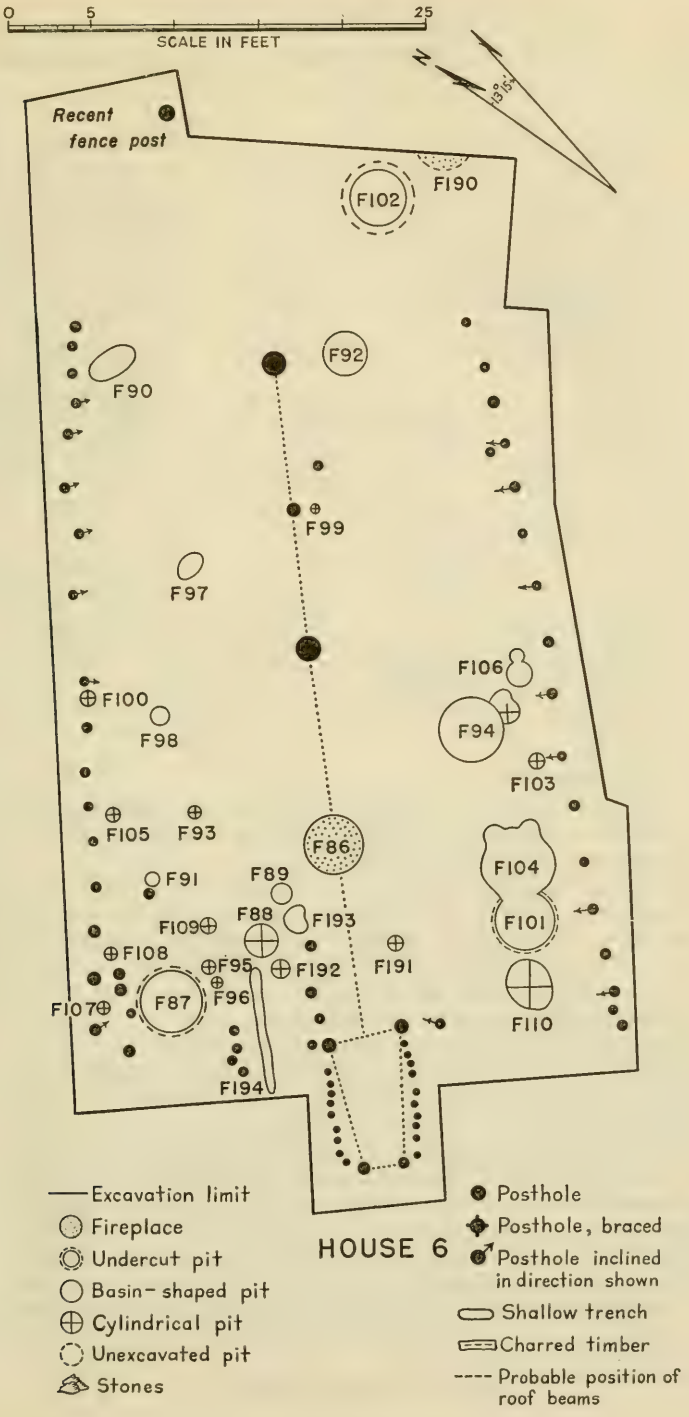
Entrance: Directed toward the southwest, it diminished in width away from the house. It was lined by two convex rows of small post butts 0.2 to 0.3 foot in diameter; they were not set in trenches.

Fireplaces: The primary fireplace was lined with yellow clay, as was the hearth in House 1. There were no auxiliary fireplaces in the house, although one was present behind the house.

Firescreen: A probable firescreen trench northwest of the entrance posts was devoid of any trace of posts.

Other: The house had not burned, and the floor level was determined by the tops of such features as the primary fireplace and other pits, and by artifacts lying horizontally in the soil. The structure is interpreted as a dwelling unit.

Map 10.—Plan of House 6.


0 5 25
SCALE IN FEET
N
Recent fence post
F102
F190
F92
F90
F99
F97
F106
F100
F98
F94
F103
F105
F93
F86
F104
F91
F89
F88
F193
F101
F109
F108
F95
F192
F191
F87
F96
F107
F110
F194
Excavation limit
Fireplace
Undercut pit
Basin-shaped pit
Cylindrical pit
Unexcavated pit
Stones
Posthole
Posthole, braced
Posthole inclined in direction shown
Shallow trench
Charred timber
Probable position of roof beams

HOUSE 6

TABLE 7.—*House 6 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
86	Primary fireplace	3.5	0.8	Ash, charcoal; floored with yellow clay.
87	Bell-shaped pit	Orifice, 3.6; base, 3.8	2.8	Mixed earth and compact clay.
88	Cylindrical pit	2.0	1.6	Mixed earth and clay.
89	Basin-shaped pit	1.2	.8	Mixed earth.
90	do	1.7×3.0	1.1	Mixed earth; artifacts.
91	Cylindrical pit	.8	.3	Ash.
92	Basin-shaped pit	2.7	1.5	Mixed earth; artifacts.
93	Cylindrical pit	.9	.9	Mixed earth.
94	Basin-shaped pit	3.8×4.2	2.1	Mixed earth; artifacts.
95	Cylindrical pit	0.8×1.0	1.3	Mixed earth.
96	do	.7	1.2	Do.
97	Basin-shaped pit	1.4×1.9	1.2	Mixed earth; artifacts.
98	do	1.1	.6	Mixed earth.
99	Cylindrical pit	.6	1.0	Mixed earth; bone.
100	do	.8	1.4	Mixed earth; artifacts.
101	Bell-shaped pit	Orifice, 3.5; base, 3.9	2.8	Artifacts very abundant.
102	do	Orifice, 3.5; base, 4.3	2.2	Mixed earth; corncob fragment; *behind house.*
103	Cylindrical pit	.9	.8	Mixed earth; bone.
104	do	3.8	2.8	Intersects with several pits.
105	do	.8	1.0	Mixed earth.
106	do	1.4	.9	Do.
107	do	.8	1.0	Do.
108	do	.8	1.0	Do.
109	do	1.0	1.0	Mixed earth; bone.
110	do	3.0	2.1	Mixed earth; artifacts.
190	Fireplace	3.0		Unexcavated; *behind house.*
191	Cylindrical pit	.8	1.1	Mixed earth.
192	do	1.0	.7	Do.
193	Basin-shaped pit	1.6	.6	Do.
194	Firescreen trench	0.8×7.5	.6	Do.

HOUSE 7 (map 11)

Shape: Long-rectangular.

Floor: The large number of intersecting pits in the floor suggests a long occupation, a conclusion supported by the large number of auxiliary postholes. Pits and fireplaces were abundant on the floor.

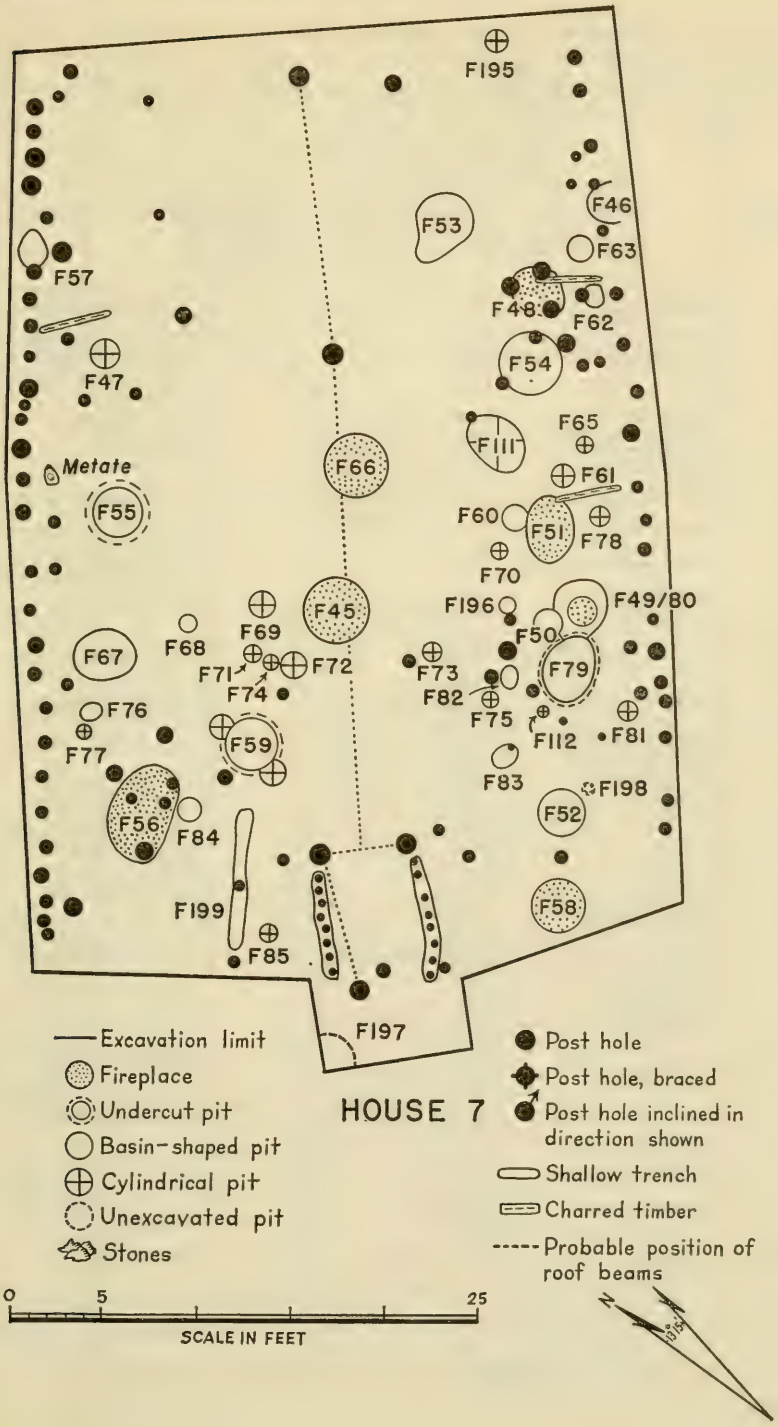
Entrance: Its sides were delimited by two shallow, parallel trenches 5.5 and 6.5 feet long, both of them containing the remains of closely spaced poles 0.4 foot in diameter. Only one of the large exterior entrance postholes was located.

Fireplaces: There was the usual basin-shaped primary fireplace in the house midline, and another fireplace was between it and the center post. There were five additional auxiliary fireplaces elsewhere in the floor. One of them, Feature 49, was intrusive into the fill of a basin-shaped pit, Feature 80.

Firescreen: There was a shallow, parallel-sided trench north of the interior entrance posts, 7.5 feet long and 0.6 foot wide; it was 0.6 foot deep. It contained the remains of a single post butt 0.6 foot in diameter.

Comments: Three pits, Features 53, 54, and 72, were filled with calcined granite, so finely pulverized that it resembled sand, apparently the raw material for pottery temper. The house was destroyed by fire, and this action preserved a number of large posts, particularly in the northwest house corner near the entrance, where the floor was covered with a heavy layer of ash and charcoal. The remains of four charred timbers, three of which are indicated on the house map, were on the house floor at right angles to the sidewalls, one end of each of them

MAP 11.—Plan of House 7.

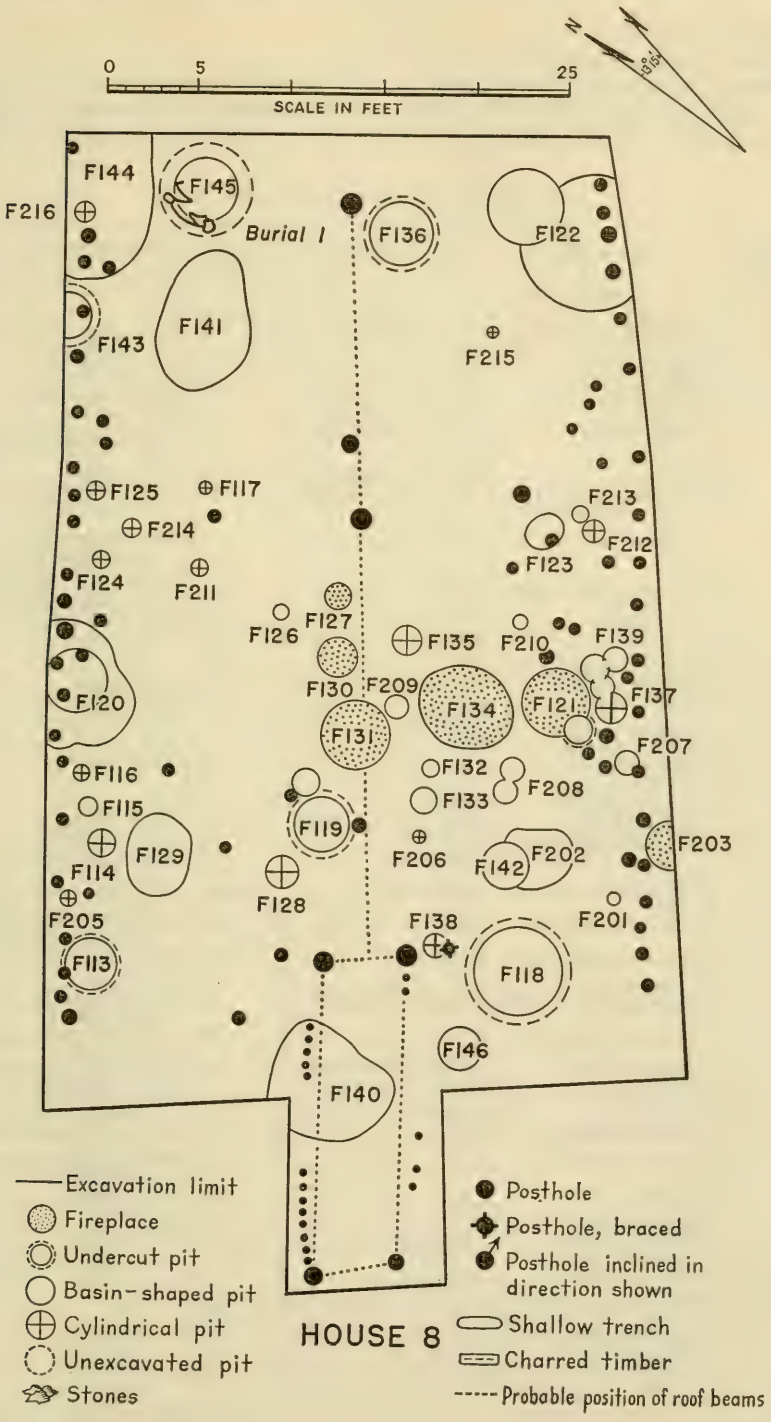

F195
F46
F53
F63
F57
F48
F62
F54
F47
F65
F111
Metate
F66
F61
F55
F60
F51
F78
F70
F196
F49/80
F45
F69
F50
F68
F67
F73
F79
F71
F72
F82
F74
F75
F76
F112
F81
F77
F59
F83
F198
F56
F84
F52
F199
F58
F85
F197
Excavation limit
Fireplace
Undercut pit
Basin-shaped pit
Cylindrical pit
Unexcavated pit
Stones
HOUSE 7
Post hole
Post hole, braced
Post hole inclined in direction shown
Shallow trench
Charred timber
Probable position of roof beams
0
5
25
SCALE IN FEET
N

adjoining a wall posthole. These collapsed wall posts extend 4.5 feet onto the floor from the midpoints of their respective postholes. A single metate was in place along the northwest wall, but lacking an associated mano. This house is interpreted as a dwelling unit.

TABLE 8.—*House 7 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
45	Primary fireplace	3.5	0.7	Ash, charcoal; pottery.
46	Basin-shaped pit	1.8	.5	Mixed earth; *predates house.*
47	Cylindrical pit	1.5	.7	Ash, hard mixed earth.
48	Auxiliary fireplace	2.4	.4	Ash, charcoal; pottery; contains 3 postholes.
49	do	1.5	.5	Ash, charcoal, clay; in Feature 80.
50	Basin-shaped pit	1.6	.9	Mixed earth.
51	Auxiliary fireplace	2.5×3.5	.6	Ash; pottery.
52	Cylindrical pit	2.3	.7	Mixed earth.
53	Basin-shaped pit	3.1×4.0	.7	Calcined granite.
54	do	3.5	.5	Do.
55	Bell-shaped pit	Orifice, 2.9; base, 4.0	4.0	Fill a compact, sterile clay.
56	Auxiliary fireplace	2.0×5.0	.8	Ash, clay; contains 4 postholes.
57	Basin-shaped pit	1.5×2.5	.5	Mixed earth; contains a posthole; *predates house.*
58	Auxiliary fireplace	3.1	.5	Ash, bone.
59	Bell-shaped pit	Orifice, 2.9; base, 4.0	1.7	Mixed earth.
60	Cylindrical pit	1.5	.5	Do.
61	do	1.3	1.0	Do.
62	Basin-shaped pit	1.6×2.0	.3	Mixed earth; one posthole.
63	do	1.4	.4	Mixed earth.
64	Cylindrical pit	1.2	.7	Not on house map.
65	do	.9	1.0	Mixed earth.
66	Auxiliary fireplace	3.3	.6	Ash, charcoal.
67	Cylindrical pit	3.2×3.5	2.0	Mixed earth.
68	Basin-shaped pit	.9	.3	Do.
69	Cylindrical pit	1.5	1.5	Do.
70	do	.9	1.4	Mixed earth; bone.
71	do	.9	.3	Mixed earth.
72	do	1.6	.9	Ash and calcined granite.
73	do	1.0	1.5	Mixed earth; one large stone.
74	do	.8	.4	Mixed earth; bone.
75	Cylindrical pit	.7	1.0	Mixed earth.
76	Basin-shaped pit	1.2×1.5	.5	Do.
77	Cylindrical pit	.8	1.0	Do.
78	do	1.0	1.5	Do.
79	Bell-shaped pit	Orifice, 3.2; base, 3.7	1.7	Mixed earth; artifacts.
80	Basin-shaped pit	3.2	.7	Clay, mixed earth; contains Feature 49.
81	Cylindrical pit	1.0	.4	Mixed earth.
82	Basin-shaped pit	1.1×1.4	.4	Do.
83	do	1.3×1.6	.5	Mixed earth; contains a small posthole.
84	Basin-shaped pit	1.3	.8	Mixed earth.
85	Cylindrical pit	.9	.9	Mixed earth; bonemeal.
111	do	1.2×3.5	4.0	Mixed earth; artifacts.
112	do	.5	.8	Mixed earth; one mano.
195	do	1.2	.7	Mixed earth.
196	Basin-shaped pit	.9	.3	Do.
197	Unexcavated pit	2.0		*In front of house.*
198	Pottery floor rest	.7	.1	A coil of charred vegetal fibers on house floor.
199	Firescreen trench	0.6×7.5	.6	Mixed earth; one post butt.

MAP 12.—Plan of House 8.


0
5
25
SCALE IN FEET
N
N
19.5°
F144
F145
F216
Burial 1
F136
F122
F141
F143
F215
F125
F117
F213
F214
F212
F123
F124
F211
F126
F127
F135
F210
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F120
F130
F209
F134
F121
F137
F131
F207
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F133
F119
F206
F203
F129
F142
F202
F114
F128
F205
F138
F201
F113
F118
F146
F140
Excavation limit
Fireplace
Undercut pit
Basin-shaped pit
Cylindrical pit
Unexcavated pit
Stones
Posthole
Posthole, braced
Posthole inclined in direction shown
Shallow trench
Charred timber
Probable position of roof beams
HOUSE 8

House 8 (map 12)

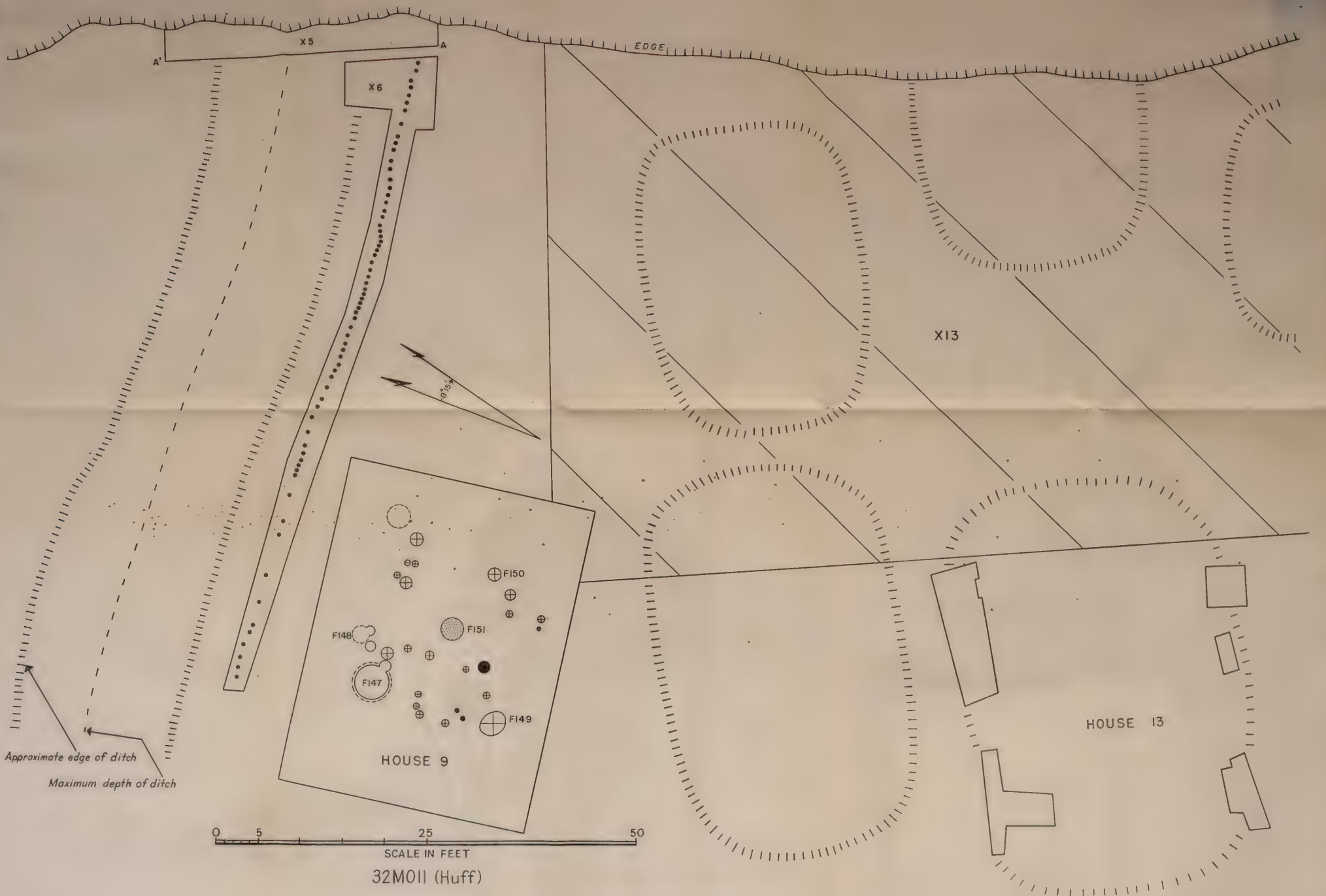
Shape: Long-rectangular.

Floor: The house had been burned, and it was thinly spread with a deposit of ash. The floor was built over a number of older refuse pits: Features 113, 120, 122, 140, 141, 143, and 144 clearly predate the construction of the house, since

Table 9.—*House 8 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
113	Bell-shaped pit	Orifice, 2.9; base, 3.1	1.8	Mixed earth, ash; artifacts; *predates house.*
114	Cylindrical pit	1.6	1.2	Mixed earth.
115	Basin-shaped pit	1.3	.7	Do.
116	Cylindrical pit	.9	.5	Mixed earth; bone.
117	do	.7	.9	Mixed earth.
118	Bell-shaped pit	Orifice, 4.2; base, 4.9	4.9	Mixed earth, clay, charcoal; largest excavated pit.
119	do	Orifice, 2.4; base, 3.0	3.5	Mixed earth.
120	Basin-shaped pit in floor of irregularly shaped pit.	7.0	2.0	Mixed earth; 5 intrusive postholes; *predates house.*
121	Auxiliary fireplace	4.0	.6	Ash; adjoining small undercut pit 1.0 feet deep; orifice 1.2, base 1.5.
122	Two intersecting basin-shaped pits.	6.0; 4.0	2.0	Mixed earth; 4 intrusive postholes; *predates house.*
123	Cylindrical pit	1.6×2.0	1.4	Mixed earth; artifacts.
124	do	.9	1.5	Mixed earth.
125	do	1.0	1.4	Do.
126	Basin-shaped pit	.8	.3	Do.
127	Auxiliary fireplace	1.4	.6	Ash, pottery.
128	Cylindrical pit	1.5	1.1	Mixed earth; bone.
129	do	3.6×4.5	2.5	Mixed earth.
130	Auxiliary fireplace	2.0	.2	Ash.
131	Primary fireplace	4.0	.5	Ash, pottery.
132	Basin-shaped pit	.9	.6	Mixed earth.
133	do	1.3	.9	Do.
134	Auxiliary fireplace	4.4×5.5	.9	Ash.
135	Cylindrical pit	1.5	1.0	Mixed earth.
136	Bell-shaped pit	Orifice, 3.5; base, 4.0	2.5	Mixed earth, clay.
137	Cylindrical pit	1.6	1.5	Mixed earth, ash.
138	do	1.2	1.0	Mixed earth; granite stones.
139	3 intersecting cylindrical pits.	1.0 (each)	.9 (each)	Mixed earth; bone; artifacts.
140	Irregularly shaped pit	6.5	1.5	Mixed earth; 5 intrusive postholes; *predates house.*
141	Irregularly shaped pit	8.5×10.5	1.0	Mixed earth; *predates house.*
142	Cylindrical pit	2.2	1.4	Mixed earth.
143	Bell-shaped pit	Orifice, 3.4; base, 5.0	4.2	Intrusive posthole; *predates house.*
144	Irregularly shaped pit	7.7	1.2	4 intrusive postholes; *predates house.*
145	Bell-shaped pit	Orifice, 3.5; base, 5.0	4.8	Mixed earth; Burial 1.
146	Basin-shaped pit	2.8	1.7	Mixed earth; bone.
201	do	.7	.3	Mixed earth.
202	do	2.7×3.5	.3	Do.
203	Auxiliary fireplace	2.5	.6	Ash, in wall line; *predates house.*
204	Cylindrical pit	.5	.5	Not on map; between F128 and F129.
205	do	.9	1.0	Mixed earth.
206	do	.7	.9	Do.
207	Basin-shaped pit	1.4	.5	Ash.
208	2 intersecting basin-shaped pits.	1.2 (each)	1.1 (each)	Mixed earth.
209	Basin-shaped pit	1.3	.4	Do.
210	do	.8	.9	Do.
211	Cylindrical pit	.9	1.0	Do.
212	do	1.3	1.0	Do.
213	Basin-shaped pit	.9	.3	Do.
214	Cylindrical pit	1.0	.9	Do.
215	do	.6	.6	Do.
216	do	1.0	1.8	Do.

221-350 O - 67 (Face p. 48)



Map 13.—Plan of Houses 9 and 13 and the northwest fortification system.

wall posts had been set into the fill of most of them. It is more than likely that other pits similarly predate the structure.

Entrance: There were two partial rows of postholes averaging 0.4×0.5 foot along its sides. Some of these posts were intrusive into Feature 140, an older, refuse-filled pit.

Firescreen: No evidence of a firescreen was found.

Burial: A single, flexed adult human female skeleton was in Feature 145, a deep bell-shaped pit in the back of the house. There were no direct burial associations, although the fragmented remains of a small canid skeleton were on the pit floor near the woman.

Comments: The floor of this house is marked by a number of large refuse-filled pits that obviously predate the construction of the house. These features were probably dug between Houses 1 and 7, and House 8 was built on this location after these pits had been filled with refuse. There seems to be no significant difference between the fill of these pits and the artifacts from the house floor (see table 15), and it is presumed that there was no great timelag between the filling of these pits and the construction of the house itself. The structure is interpreted as a dwelling unit.

House 9 (map 13)

Shape: Indeterminate. This house site was marked by a prominent but ambiguous depression in the sod about 16 feet in diameter and a foot deep; it was either squarish or circular in outline. No clear house pattern was observable at the completion of the house excavation.

Dimensions: Unknown. No wall lines nor identifiable center support posts are present.

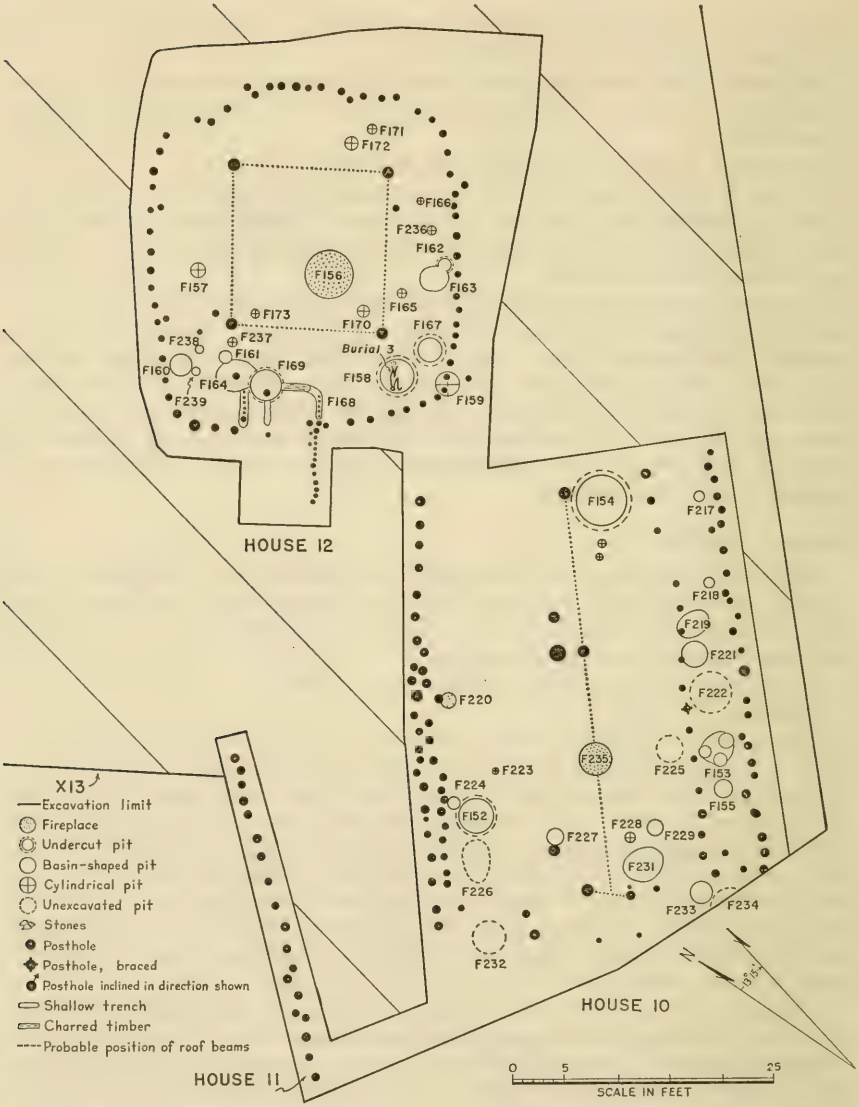
House features: Pit walls, if once present, were removed by the road patrol when it scraped the house down to the floor level. The only fireplace, Feature 151, was 2.5 feet in diameter and 0.5 foot deep; it was in the approximate center of the house depression and it was about the same size as the primary fireplaces in the long-rectangular houses. The house floor was rather dish shaped, with the fireplace in its center. There was one bell-shaped pit, Feature 147; its orifice was 4.0 feet wide, and it was 3.2 feet deep, and 4.6 feet wide at the base. There were two cylindrical pits, Features 149 and 150, respectively 1.0 and 1.5 feet in diameter and 1.3 and 1.0 feet deep. One pit, 2.0 feet in diameter, and capped with mixed earth, was not excavated.

Comments: The features surrounding the fireplace, and the position of the fireplace in a basin-shaped depression beneath a distinct surface depression, suggest that this complex of features represents a house. It appears unlikely that these features were placed in an old borrow pit, the only other plausible source for a depression of this size. It is equally improbable that the road patrol removed all evidence of wall and center posts. The floor of the cut was checked constantly throughout the work, and no posts were removed that were not later verified. Had the road patrol removed the tops of postholes their bottoms should have remained, for only a few tenths of a foot were removed from the tops of features around the fireplace. In view of these circumstances, it is probable that this house differed in architecture from the rest of the structures excavated at the site.

House 10 (map 14)

Shape: Long-rectangular.

Floor: This house was initially stripped to floor level by the road patrol, and any evidence of a former house pit was obliterated by this operation. Most of



MAP 14.—Plan of Houses 10, 11, and 12.

the floor was covered by a few tenths of a foot of house fill when excavation with handtools began.

Roof supports: There was a distinct second line of wall posts along the southeast wall for the entire length of the house, spaced 5 to 6 feet inside the sidewall. Part of a second line of posts was on the northwest sidewall, but it was nearer the wall than the other auxiliary row. Initially it was assumed that these auxiliary rows were part of a second structure, but it was not possible to define a second entrance or end post. These additional rows of posts may have resulted from

partial rebuilding, or from structural forms not present in the other excavated houses.

Entrance: The exterior entrance posts were apparently under the overburden beyond the edge of the road patrol cut; if so, the passage was more than 8 or 9 feet long.

Firescreen: No evidence of a firescreen was observed.

Comments: The house had not been burned. A number of pits in the floor were not dug because of the lateness of the season and of the desirability of completing the work on House 12.

TABLE 10.—*House 10 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
152	Bell-shaped pit	Orifice, 3.3; base, 3.6	3.0	Mixed earth, ash; artifacts.
153	Irregularly shaped pit	3.0	1.6	Contained 3 small cylindrical pits.
154	Bell-shaped pit	Orifice, 4.7; base, 5.7	4.7	Hard, compact clay; artifacts.
155	Basin-shaped pit	2.5	.7	Mixed earth.
217	do	1.0	.5	Do.
218	do	2.5×3.4	.7	Do.
220	Auxiliary fireplace	1.5	.3	Ash, charcoal.
221	Basin-shaped pit	2.5	.7	Mixed earth.
222	Unexcavated pit	4.0		Do.
223	Cylindrical pit	.5	.5	Do.
224	Basin-shaped pit	1.2	.4	Do.
225	Unexcavated pit	2.5		Do.
226	do	3.0×4.5		Do.
227	Basin-shaped pit	1.5	.5	Do.
228	Cylindrical pit	1.0	1.5	Do.
229	Basin-shaped pit	1.5	.4	Do.
230	(Number not used)			
231	Basin-shaped pit	3.0×4.0	.5	Do.
232	Unexcavated pit	3.0		Do.
233	Basin-shaped pit	2.0	1.2	Do.
234	Unexcavated pit	2.8		Do.
235	Primary fireplace	3.0	.6	Ash, charcoal.

HOUSE 11 (map 14)

Shape: Presumably long-rectangular.

Floor: The southeast wall of this house, noted along the edge of the road patrol cut in Excavation 13, was traced for a distance of 31 feet. The postholes of this wall were mapped, their diameters taken, and several of the better preserved posts removed for tree-ring analysis. The posts averaged 0.6 foot in diameter; some of them were more than 1.5 feet deep.

Other: This house had burned. No floor features were exposed.

HOUSE 12 (map 14, pl. 3, *a*)

Shape: Subrectangular.

Dimensions: Total house length, about 39.5 feet (the exterior entrance posts were not located); length of the house floor along the axis of the entryway, 32 feet; house floor width, 29 feet. There was no trace remaining of walls along the house edges, if the house was initially constructed in a pit, because the floor was exposed by the road patrol.

Floor: Tramped earth, somewhat depressed near the house center.

Roof supports: Four large postholes, averaging 1.0×2.5 feet, were in the house center around the primary fireplace in the form of a square about 15 feet on a side. The corners of this square were oriented approximately with the four cardinal directions. The wall posts circumscribed a floor with gently

convex walls and rounded corners. Wall posts were vertical, spaced about 1.5 feet apart, and averaged 0.6 foot in diameter and 1.0 foot deep.

Entrance: The southwest wall of the house was broken by a gap in the post line 4.5 feet wide. There was a single row of wood stains extending at right angles to this wall to the southwest for a distance of 7.5 feet, representing the south wall of the entry. Originally the passage was probably longer, as no large exterior postholes were located. One unusual feature associated with the entrance is unique to House 12. This is Feature 168, a U-shaped trench, the sides of which coincided with the sides of the entry. It contained the remains of small pole butts 0.3 foot in diameter on one side; its center contained a horizontal beam set into the trench flush with the floor level. This "sill" and associated features is not analogous to any feature of which I am aware in other local house types.

Fireplace: The primary fireplace, Feature 156, was offset toward the south corner of the square formed by the four center posts. There were no auxiliary fireplaces.

Burial: Burial 3 was in Feature 158, a bell-shaped pit in the south corner of the house. This adult female was tightly flexed and was resting on the pit floor. There were traces of wood over the bones, and the overlying earth contained abundant refuse. The skull was missing but the body was otherwise intact. There were no definite burial associations, although a cannon bone fleshing tool was near the hand bones.

Firescreen: A shallow, parallel-sided trench was to the left of the entryway. It was lined with the butts of poles 0.2 to 0.3 foot in diameter.

Other: This house had been burned. It is interpreted as a dwelling unit.

TABLE 11.—*House 12 floor features*

Feature No.	Identification	Maximum diameter	Maximum depth	Contents and comments
		Feet	*Feet*	
156	Primary fireplace	4.6	1.0	Hard ash, charcoal.
157	Cylindrical pit	1.6	.8	Mixed earth.
158	Bell-shaped pit	Orifice, 3.5; base, 4.0	3.2	Mixed earth, refuse; Burial 3.
159	Cylindrical pit	1.8	1.2	Mixed earth; cache of waste flakes; *predates house.*
160	Basin-shaped pit	2.2	.7	Mixed earth; bone.
161	do	1.2	.5	Mixed earth.
162	Bell-shaped pit	Orifice, 1.2; base, 1.6	1.2	Mixed earth; intersects with F163.
163	Basin-shaped pit	2.5×3.0	.8	Mixed earth.
164	do	3.5×4.0	.7	Mixed earth; intersects with F161.
165	Cylindrical pit	.9	1.5	Mixed earth, ash.
166	do	.6	.5	Mixed earth.
167	Bell-shaped pit	Orifice, 2.5; base, 3.0	2.5	Do.
168	Entrance "sill" and trench.	.6×10.0	.3	Vertical post butts, horizontal beam.
169	Bell-shaped pit	Orifice, 2.4; base, 2.8	2.8	Mixed earth; one intrusive posthole.
170	Cylindrical pit	1.1	1.3	Mixed earth.
171	do	.9	1.4	Do.
172	do	1.2	1.7	Do.
173	do	.8	1.2	Do.
236	Basin-shaped pit	.4	.5	Do.
237	Cylindrical pit	.9	.6	Do.
238	Basin-shaped pit	.8	.3	Do.
239	do	.8	.4	Do.

House 13 (map 13)

Shape: Long-rectangular.

Comments: Thad. Hecker's previous work at Huff had shown that the front of Houses 5 and 18 was distinctly wider than the back. In order to determine whether this variation was a constant or a coincidence, he dug the sidewalls of House 13. This summary of the work was taken from his field notes dated October 1939, and from his published account (Will and Hecker, 1944, pp. 19, 95).

"Only enough posts in each side of this lodge were located to definitely show the contour of the side walls," since the earth was so hard at the time of the work that it broke into large clods, and he "did not want to spoil the [house] site for future [excavation] . . . ." Within the limits of five irregular trenches, Hecker determined that there was a difference of 6 feet between the width of the front and that of the back walls. The structure was 47 feet long; the front end was 33 feet wide, and the back end was 27 feet wide. He prepared a sketch of the post-holes located, but it was not possible to overlay this plat with a map of the excavations made in 1960.

Houses 14–17 (see map 4)

Shape: Long-rectangular.

Comments: In addition to excavating House 5, and testing the walls of Houses 13 and 18, Thad. Hecker also tested a number of other houses at Huff. I was unsuccessful in finding any notes Hecker may have made regarding these test excavations among the manuscript material he left with the State Historical Society of North Dakota. The test pits in Houses 14 through 17, therefore, were remapped in 1960, but since they were not reopened at that time, there is nothing to add to the site data.

House 18 (see map 4)

Shape: Long-rectangular.

Comments: The following remarks on this house derive from field notes by Thad. Hecker dated August 1939, and from his published account (Will and Hecker, 1944, pp. 19–21). His work was designed to determine the house outline; only a fraction of the floor was excavated.

A trench 2 to 3 feet wide was dug along the southeast wall to expose posts, with two smaller trenches on the northwest wall for the same purpose. The walls were defined well within the edges of the house depression. House dimensions: length, 48 feet; back width, 31 feet, and front width, 35 feet. As elsewhere in the site, there was a difference in house width, with the southwest end 4 feet wider than the opposing end.

Most of the posts found protruding above the floor were left standing and undisturbed; they were 6 to 8 inches in diameter. The house had burned, and Hecker noted three charred oak posts, broken when the house collapsed. One of them, on the southeast wall, was 4 feet 1 inch long; the two along the northwest wall were 4 feet 3 inches and 4 feet 5 inches long. The house was built over a pit about a foot deep. I append here a statement from his notes which is not wholly clear: ". . . the posts on the South wall show that the logs were set in panels with the ends overlapping (sixteen foot logs being used in the construction of the side wall)."

Only part of the house ends were dug, as no posts were found when the end of the floor was reached and he did not wish to go below the floor level to seek them, and thus disturb the house for possible later work. Only a small part of the floor was exposed, and only a few artifacts recovered, including a "broken platform pipe made of fine sandstone." The pipe to which he refers was in the Historical

Society displays and is illustrated here (see fig. 6, *c*). It is not a platform pipe but a T-shaped form.

House 19 (map 15)

This structure was directly south of House 2. It was chosen as the subject for a detailed contour map in 1960 because it was perhaps the most clearly defined house depression at the site. The depression was distinctly rectangular in outline. It was 48 feet long; the southwest end was 39 feet wide, and the opposing end about 28 feet wide. This conformation parallels, in slightly exaggerated form, that observed in the floor plans of the excavated long-rectangular houses.

A number of surface features appear to be directly related to the presumed floor plan of the underlying house, assuming that the wide end is the front of the house, as it is in each of the excavated lodges. The front edge of the depression is steep, with a slight ridge of earth along the front end and very conspicuous ridges along both sides. There was a very slight hummock about 5 feet from the front of the house depression; such features, larger and more prominent in some of the other houses, are in the approximate position one might expect to locate the primary fireplace. A feature noted in other houses, but lacking here, was a low ridge of earth extending along the midline of the house depression.

FORTIFICATION DITCH AND PALISADE

Excavation 2 (map 16)

The delineation of Bastion D in this excavation by Howard (1962 b, fig. 4) provides an exceptionally clear picture of the complex nature of the Huff fortifications. The defensive measures at Bastion D consisted of a ditch 4.5 feet deep, along the inner edge of which was a line of small postholes slanting outward. Howard (1962 b, pp. 2, 14) speculates that this line represents a sort of *cheval-de-frise* of sharpened stakes, the ends of which faced the ditch. Five feet inside this line were the vertical posts of the bastion wall.

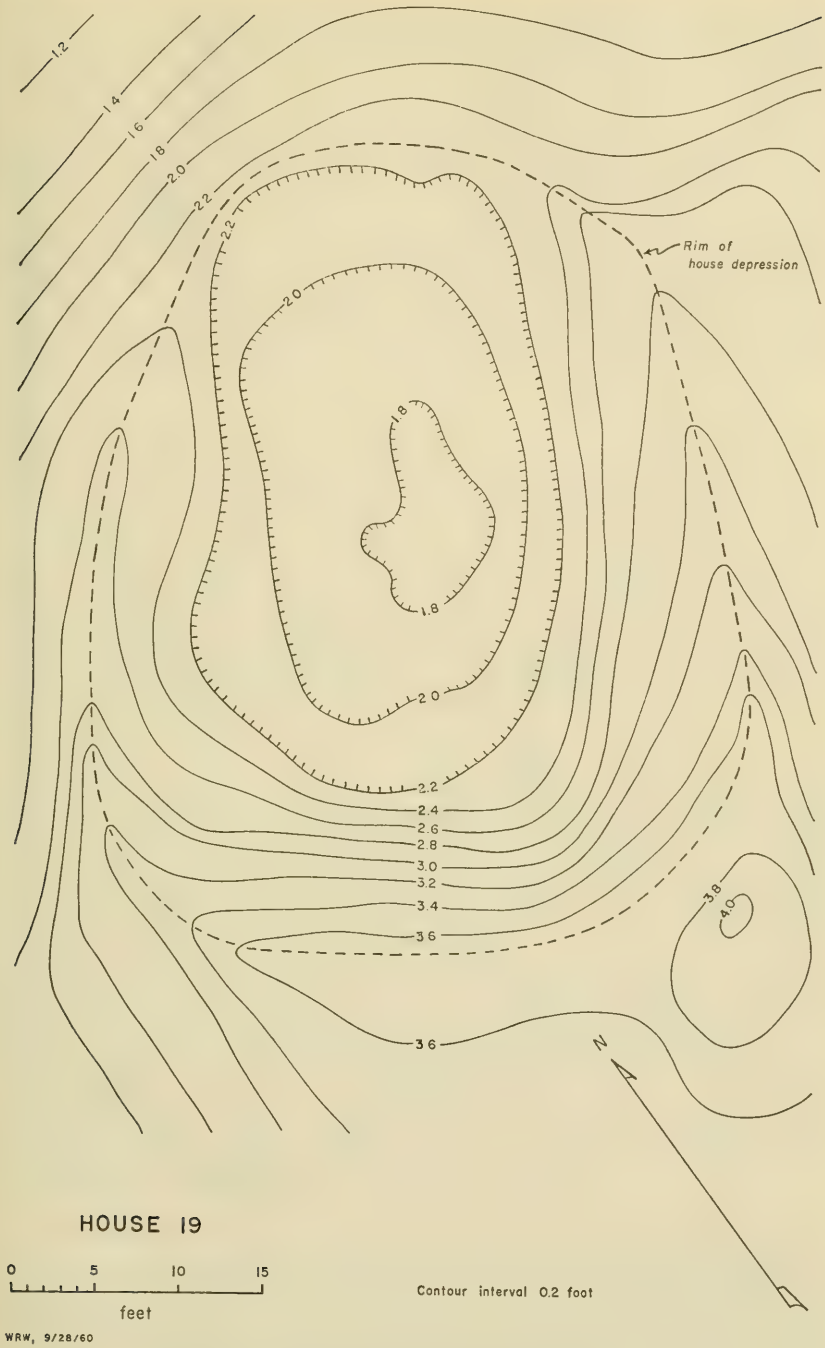
The bastion gorge, or entrance, was 7.0 feet wide, the flanks expanding toward the convex end; the bastion projected 13.0 feet out from the square corner of the fortification system. There was a fireplace, 3.0 feet in diameter and about a foot deep, in the bastion's center; it was filled with hard white ash and charred refuse. The evidence on which Howard (1962 b, pp. 2, 14) based his statement that there was a sort of watchtower in the bastion set on posts is unfortunately not detailed, although there are a number of posts within the bastion.

Excavation 4 (map 7)

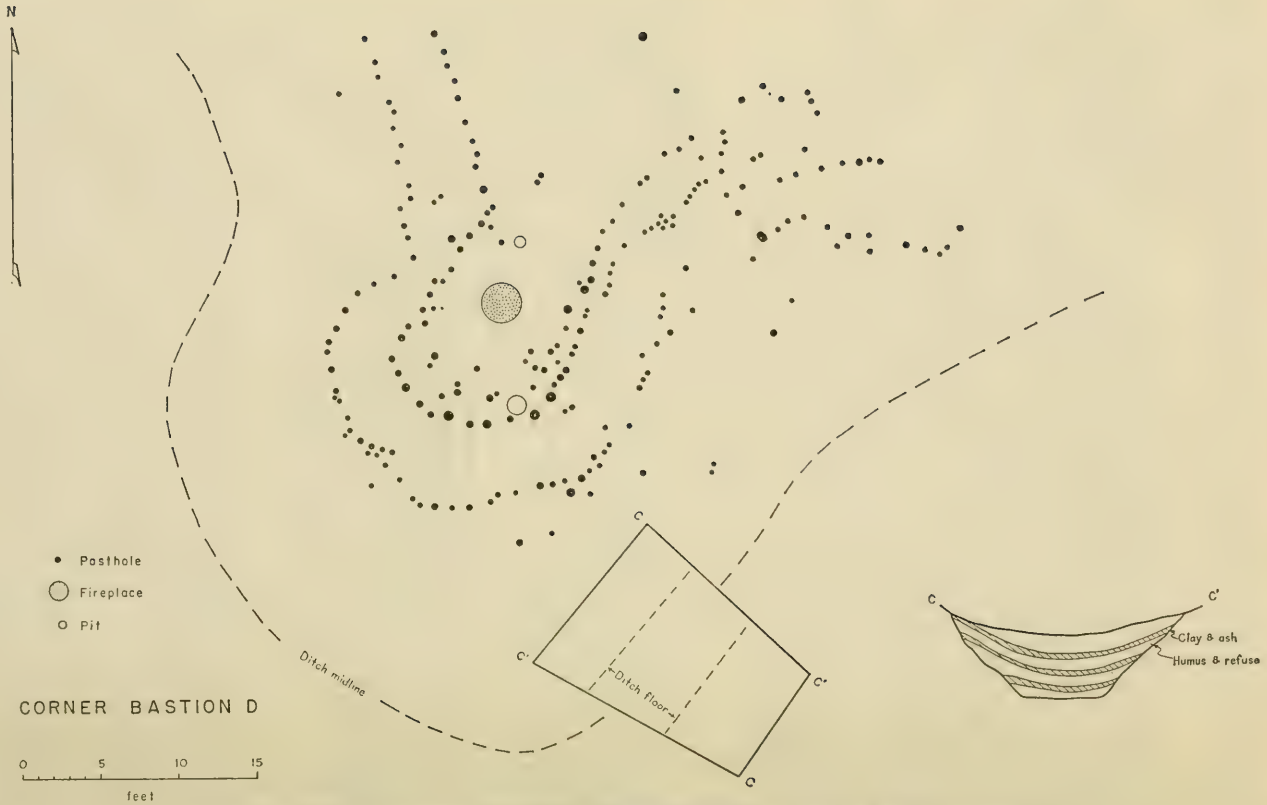
This excavation was first opened by Howard in 1959 (1962 b, fig. 6), and it was cleared and then remapped in 1960 when Excavation 7 was made. This unit exposed Bastion A, on the eastern extremity of the fortification system. This feature was 20 feet long, but since the palisade was indented on the south side of the bastion, it projected only 16 feet beyond the palisade line. The gorge was 8 feet wide, and the flanks converged toward the squared end, which was 5 feet wide. The structure was built on a level to somewhat rounded prominence of native earth left standing when the ditch was excavated along the bastion faces. There was a shallow depression on the inner side of the ditch on the southwest side of the bastion that corresponds to a gap and indentation in the palisade line. This gap, marked by a "Y" on map 7, may have served as an entrance into the fortified area.

Excavation 7 (map 14)

This unit continued the line of the palisade toward the southwest from Bastion A for a distance of 85 feet. The 75 postholes exposed in the unit were spaced



Map 15.—Contour map of surface of House 19.



MAP 16.—Plan of Bastion D and the Excavation 2 ditch profile (after Howard).

about 1 foot apart, and averaged 0.4 foot wide and 0.7 foot deep; they were first noted at an average depth of 0.8 foot. The posts themselves were represented by wood dust and occasional small pieces of wood, but there were no timbers suitable for tree-ring analysis.

As nearly as can be determined the palisade followed the top of an earthen ridge along the inside of the ditch, as shown in profile B (line B–B′, map 7, and map 17, *b*). The palisade posts were set vertically in this loose soil, which derived from the excavation of the ditch by the builders, and were not set in individually excavated postholes. There are a few gaps in the palisade line, accounted for by the fact that the posts were set in mixed earth, and in spots rodent activity had scattered wood dust throughout the soil and obscured the molds. The palisade line was relatively straight, with a few gentle undulations in the line that did not appreciably affect its general trend toward Bastion B. There was some refuse along the palisade, notably bone, with a few chert flakes and pottery sherds present.

Excavation 5 (map 13)

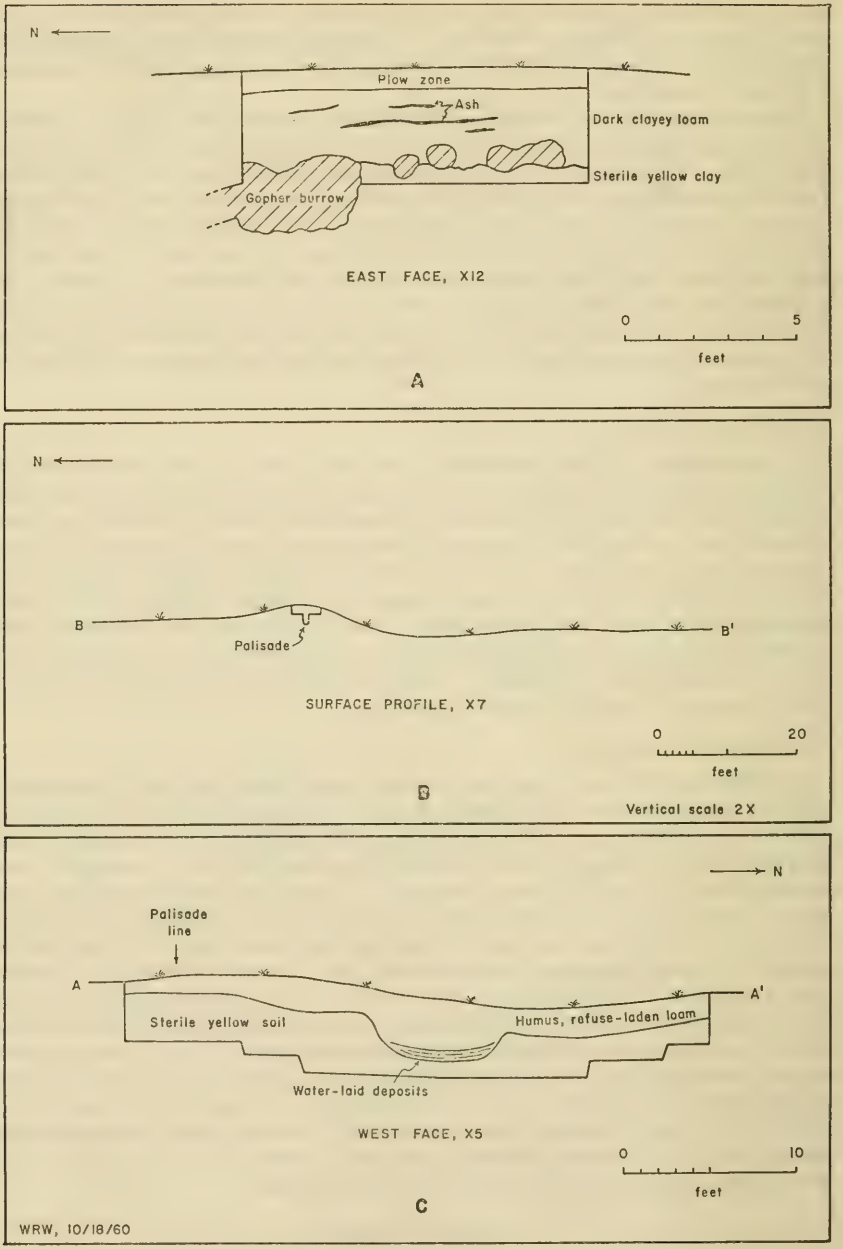
A cross section of the fortification ditch was made in the riverbank in the northern extremity of the site. This cut (profile A, line A–A′, map 13 and map 17, *c*) was 34 feet long and was taken to a maximum depth of 5.5 feet, completely exposing the ditch profile. The ditch was originally dug to a depth of 2.5 feet into a sterile yellow clay. It was 8.5 feet wide, and broadly U-shaped. Its floor was covered with thin lenses of water-laid deposits, and the rest of its fill consisted of fine windblown silt and sand. The ditch rims were blanketed with a thin layer of humus and refuse-laden soil, which in turn was covered with windblown deposits a foot in thickness. There were no artifacts in the ditch fill, but a few fragments of animal bone were present.

Excavation 6 (map 13)

The palisade line was continued in this excavation from the Excavation 5 profile to the southwest. This irregular unit extended for 79 feet along the inner edge of the ditch, exposing 67 postholes. As in Excavation 7, the line of posts is relatively undulating, but this deviation does not affect the generally straight westerly trend of the line toward Bastion J. During the work the molds, noted at an average depth of 0.8 foot below the surface, were simply marked by stakes, and the excavation was mapped without having cored them. In view of the salvage nature of the project it was deemed adequate to show that the palisade line exhibited no special features within the 100-foot strip adjacent to the river. The posts were assumed to have been of the same general size as those in Excavation 7, an assumption confirmed by observations made at the time they were exposed, and the posts are accordingly shown as such on map 13. It was established, however, that they were set vertically into the earth. It should be remarked here that in neither Excavation 6 nor 7 was the trench wide enough to reveal the line of outward-pointing holes that Howard noted at Bastion D in Excavation 2, 5 feet out from the vertical palisade line.

HUMAN REMAINS

The burial customs of the inhabitants of Huff are known only by the observations on three individual burials exhumed in 1960; from a few bones recovered in House 2 in 1959; and from information provided by a local amateur. The remains from a mound outside



Map 17.—Excavation profiles. *a*, East profile of Excavation 12, in mound at Site 32MO11b. *b*, Surface profile of the southeast fortification ditch and palisade (profile B) of the Huff Site (32MO11). *c*, West profile of Excavation 5 (profile A) of the Huff Site (32MO11).

the ditch, recovered in 1960, are of dubious affiliation with the village. The three burials recovered in 1960 were studied in detail by Dr. William M. Bass III and Walter H. Birkby, of the University of Kansas, Museum of Natural History. Their analyses of these burials (Bass and Birkby, 1962) have been abstracted in the following descriptions.

BURIAL 1 (pl. 4, *b*):

Context: The most complete of the three burials was in Feature 145, a bell-shaped pit in the rear of House 8. The individual, identified as female, was lying on her right side in a flexed position, with her back against the pit wall. The orientation of the body was north-south, with the face directed to the southeast. The bones were resting directly on the pit floor, together with scraps of bison bone and a fragmented canid skeleton. There were no artifacts clearly associated with her, although pottery and other refuse were inclusive in the fill above and around the bones. The pit fill above the burial contained abundant refuse, the pit having served as a refuse pit after the inhumation had been made.

Analysis:

Sex: Female.

Age: 45–50.

Stature: 5 feet 8¼ inches (173.44 cm.) to 5 feet 11 inches (180.54 cm.). Mean, 5 feet 9⅝ inches (176.99 cm.).

Pathologies: Osteoarthritic changes in the spine and long bones. All teeth were badly worn, five of them having been lost before death.

Anomalies: 25 presacral vertebrae (24 are normal), 13 left ribs (12 are normal). Two neural arches are separate and articulate with L5 and S1.

Miscellaneous: The majority of the hand bones are missing.

BURIAL 2:

Context: The remains of this individual were located during the stripping of sod and overburden in Excavation 13 (map 4). The first clue to the burial was the recovery of a rib protruding from the wall of the road patrol cut. The patrol was diverted to other work and the remains were removed with all haste consonant with necessary observations of context. The mandible, a clavicle, the humeri, and a number of ribs were recovered. From the scattered position of the bones the burial is identified as a bundle burial. It was 1.5 feet below the present surface and about 0.6 foot below the former ground level in a pit about 2.5 feet in diameter, but of indeterminate form. There were no associated artifacts.

Analysis:

Sex: Female.

Age: 20–24.

Stature: 5 feet ¾ inches (154.32 cm.) to 5 feet 4¼ inches (163.22 cm.). Mean, 5 feet 2½ inches (158.77 cm.).

Pathologies: Teeth were worn; two of them were lost before death.

Miscellaneous: The mandible and fragmentary arm bones were the only criteria for sex and height.

BURIAL 3:

Context: This burial was in the south corner of the floor in House 12, in Feature 158, a bell-shaped pit. The bones were resting on about half a foot of

refuse-laden pit fill, but there were no clear burial associations. A cannon bone fleshing tool near the hands may be a grave offering but this is indeterminate, since there was much refuse near the flesher. The individual was resting on the left side and was tightly flexed. The bones were in poor condition, and the skull and hand bones were missing, although a mandible was present. The body was oriented northeast-southwest, and was covered with traces of wood, over which was the refuse-laden fill of the pit.

Analysis:

Sex: Female.

Age: 40–45.

Stature: 5 feet 5 inches (164.76 cm.) to 5 feet 7⅝ inches (171.86 cm.). Mean, 5 feet 6¼ inches (168.31 cm.).

Pathologies: Osteoarthritic changes in the spine and long bones; T8 and T13 are compressed in the spine. The right pelvis and wrist show healed fractures. The teeth are badly worn; eight of them were lost before death.

Anomalies: 13 thoracic vertebrae (12 are normal), all with rib facets. L5 is completely sacralized and T6 and T7 are completely fused.

Miscellaneous: The skull and hand bones are missing.

Human remains from house 2:

Four bones—an adult radius, ulna, and two vertebral segments—were recovered in the level from the surface to a depth of 6 inches in House 2, Excavation 3, in 1959 (Howard, 1962 b, p. 10).

Human remains in excavation 12:

A mound about 35 feet in diameter and 2 feet high, designated as 32MO11–b, was situated on a low hill southwest of the site (map 2). It is probably coincidental that a line drawn from the end post in House 2 and between the two entrance posts very nearly bisects this mound. The structure was noticed as early as 1908, when A. B. Stout remarked: "Due west of Bastion E—about 700 feet is an artificial mound 35×30×1¼ [feet] that is evidently a burial [area]" (MS. collections, State Historical Society of North Dakota). A. W. Bowers (personal communication) directed my attention to the fact that human bone was in the mound, and a visit to the tumulus in 1960 was rewarded with the recovery of small fragments of long bones and a molar tooth, all from the backdirt of a gopher hole.

The mound had never been tested, to my knowledge, and in 1960 a north-south trench 10 feet long and 5 feet wide was cut in its center. The following stratigraphy was noted:

0.0–0.7-foot level: Plow zone of churned, mixed earth.

0.7–2.8/3.0-foot level: Dark mixed clayey loam, containing horizontal lenses of white ash in the top and middle levels and sprinkled with flecks of charcoal.

2.8/3.0–3.4-foot level: Dense undisturbed yellow clay.

Gopher burrows were noted in several parts of the trench (map 17, *a*), and it was in the disturbed soil of these burrows that some human bone was recovered, consisting of several long bone splinters and part of a frontal bone.

The results of the work were inconclusive. There were no artifacts from the excavation, and it appears likely that the human bone was carried in from some spot outside the trench. Since the excavation was in the mound center,

perhaps there are burials near its perimeter. The structure is obviously an artificial mound, originally more than 3 feet high, perhaps built in stages marked by the various ash lens. The lack of distinctive elements in the mound preclude any hint as to its cultural affiliation. In view of the many burial mounds along the Missouri River the chances are good that this mound is not associated with the village despite its proximity to and its direction from it.

Other human remains:

During a visit to the site in 1960, Jacob Ericson, a local collector and long-time resident of Bismarck, remarked that he had found human remains along the riverbank at Huff several years previously. At least four skulls and associated bones were seen at the base of the riverbank near the north end of the village. The bones were in poor condition and were not collected, so no further data are available.

Howard, however, states that local residents reported that human bones were found beside a road cut not far from the town of Huff (1962 b, p. 10). This locality was recently regraded, and in so doing the road patrol exposed several burials in the road cut. Personnel from the State Historical Society of North Dakota recovered what remained of the burials and a number of associated artifacts, which consisted largely of shell disks and bone awls. Unfortunately, there was no pottery, and none of the other implements were distinctive of any particular site or complex. However, if this cemetery area is to be associated with any village area, probability seems to favor its association with site 32MO12, the Jennie Graner Site (Will and Hecker, 1944, p. 96); the cemetery is accordingly designated as 32MO12–b (map 2).

Miscellaneous test excavations

A number of miscellaneous test pits made at Huff in 1960 may be briefly summarized. Excavation 8 was a 4- by 10-foot trench 1 foot deep, dug to explore the possibility that palisade posts were present along the riverbank near Bastion A; results were negative. Excavation 9 was a 5-foot square dug to a depth of 5 feet for use as a garbage pit, southeast of Bastion A. Despite its proximity to the fortification ditch, no trace of any cultural material was noted. Similarly, Excavation 10, a few feet distant, measuring 2 by 2 feet and 4 feet deep, lacked any cultural debris. Excavation 11 was a shallow trench 4 by 6 feet, dug in the center of the village plaza in hopes of detecting the sacred cedar, a prominent feature in historic Mandan sites: nothing was found in the test.

Two areas stripped of sod and overburden were designated as excavations. Excavation 13 stripped the overburden from all or part of 12 individual houses, including the excavated Houses 10 and 12. Excavation 14 was a large rectangular area stripped of sod between Houses 6 and 8 and the riverbank. It was stripped to determine whether there were houses in the area, but only five post-holes and two features were recorded. Feature 200 was a fireplace 2.0 feet in diameter, containing ash, charcoal, and floored with

burned earth. Feature 230 was a cylindrical, ash-filled pit, 1.8 feet in diameter and at least 1.2 feet deep.

ARTIFACTS

POTTERY

The pottery descriptions to follow are based solely on the sherds recovered in the 1960 excavations. Most of the pottery was so consisttent in paste, surface finish, and elements of form that it is attributed to a single intensive occupation of the site. A few atypical sherds are ascribed to alien contacts or to trade with groups which were contemporaneous with Huff.

Unfortunately it was not feasible to gather together the material from Thad. Hecker's 1938–39 fieldwork, although an inspection of the bulk of his material in the summer and fall of 1960 did not reveal any specimens which differed significantly from those described below. The description and classification of the 1960 material was carried out independently of the analysis published by Howard (1962 b), based on his 1959 excavations at Huff. A number of elements noted by Howard have been incorporated into the discussion of the general characteristics of the pottery, immediately following, but in only one case have they been added to the type descriptions as such.

The pottery from the 1960 excavations is herein assigned to three separate and previously defined wares: Riggs, Fort Yates, and Stanley Braced Rim wares. A fourth ware, Le Beau S-Rim Ware, is based on prior descriptions. Although both Howard, in his 1962 classification, and I found a few unclassifiable rims, most of the pottery can be equated with types for which there are now adequate descriptions from sites elsewhere on the Missouri River in the Northern Plains.

Howard's classification of the Huff pottery is not used here. There are several reasons for this decision. First, it is clearly undesirable to continue to multiply the already burdensome number of pottery types in the Northern Plains. Most of the types now named have been defined on the basis of work at a single site. It is therefore understandable that many of them are unduly restrictive, reflecting simply the variation permissible among the potters in a single village of what obviously was a concept shared among many villages over a period of time greater than the longevity of any given village. In many instances two different pottery types have been defined for the same material simply because the intervening variations at other sites were unknown. This has happened time and again in the Northern Plains during the past decade. In the classification to follow, several named wares and types are modified to include the somewhat divergent varieties at Huff.

The decision to modify the types in question was made during the course of a consultation with Donald J. Lehmer and reflects our current thinking relative to pottery types in this area.[3] The resulting classification not only avoids adding to the number of named types, but more clearly reveals the status of Huff as a site transitional between the Thomas Riggs and Heart River Foci.

General Characteristics:

Sample: 943 rim sherds and 3,779 body sherds.

Paste:

Method of manufacture: The irregular breakage of the pottery suggests that the vessels were lump modeled.

Temper: Grit, composed of calcined or decomposed granite, is identifiable through the presence of quartz, mica, and feldspar particles, which rarely exceed a range in size from 0.5 to 2 mm. in diameter. The surfaces of breaks show a variation in the amount, but not in the size, of temper; smaller vessels contain less temper.

Hardness: 2.5 to 3.5 (Moh's scale), predominantly 3.0.

Texture: The paste is compact and well worked, having the same consistency as pottery in Heart River Focus sites. It is appreciably less compact than "La Roche" or Chouteau Aspect pottery. Surfaces are smooth to somewhat sandy to the touch.

Color: Light buff through black, with intermediate shades of brown and gray, with dark grays predominating. A few sherds are light orange. Cores are frequently dark gray, even when interior and exterior surfaces are lighter in tone.

Surface finish: The vessel was brought to form during the shaping process by the use of a grooved paddle. This technique resulted in vertically stamped rims and shoulders, with the paddle marks tending to be random below the shoulders and at the base. Rims, necks, and shoulders were subsequently horizontally smoothed, but this action rarely obliterated the stamps, and they are generally visible as faint parallel ridges. The smoothing typically produced smooth but rarely glossy to polished surfaces; light reflection is low.

Decoration: Varies with the different wares and component types.

Form:

Lip: Predominantly round, with a few pointed to flat examples.

Rim/neck: Varies with the different wares and component types.

Orifice: In every instance where vessel fragments were large enough to determine the outline, the orifice was wide and circular.

Shoulder: Gently rounded, joining the rim at the neck in a smooth, gentle curve or, more rarely, in a slightly angular curve. There are two instances of a sharply angular shoulder, both on sherds of indeterminate type.

Body/appendages: Varies with the different wares and component types.

Size: The orifices of 40 vessels were determined from the arcs of large, restored rim sections and from large rim sherds. They clustered in three size ranges:

80–118 mm	7 vessels
162–238	31
297–336	2

[3] This consultation resulted, on my part, in the statements on the following pages. For Lehmer's interpretation of part of our discussion, see his recently published study of the Fire Heart Creek Site (Lehmer, 1966, pp. 29–32).

CLASSIFICATION:

Riggs Ware
- Riggs Plain
- Riggs Decorated Lip
- Riggs Filleted Rim

Fort Yates Ware
- Fort Yates Cord Impressed
- Fort Yates Incised
- Fort Yates Plain

Le Beau S-Rim Ware
- Le Beau Cord Impressed

Stanley Braced Rim Ware
- Stanley Tool Impressed
- Stanley Plain

Miscellaneous unclassified
- Unassigned strap handles
- Rim Examples A–D
- Unclassified cord-impressed rims

RIGGS WARE

SAMPLE: 118 rim sherds, 12.5 percent of the 1960 site sample.

SURFACE FINISH: Conforms to the statements in General Characteristics except that 12 rims of the type Riggs Decorated Lip are vertically or obliquely *brushed*, although the brushing is partly obscured by horizontal smoothing. In a few instances the rim is lightly polished.

FORM:

Lip: Usually rounded, but may be somewhat pointed or flat on the decorated rims; thickness, 4 to 9 mm.

Rim: Gently outflaring to nearly vertical. Rim thickness remains constant or nearly so from the lip to the shoulder, except that the type Riggs Filleted has an added fillet of clay applied to the exterior on the midrim. Rim height, 12 to 62 mm.; thickness, 4 to 9 mm.

Neck: Constricted to various degrees because of the outflaring rim. The rim joins the body in a smooth to slightly angular curve.

Orifice: The projected arcs of seven large rim sherds and restored rim sections are:

80 mm.	196 mm.
100	208
118	238
170	

RIGGS PLAIN

SAMPLE: 13 rim sherds, 1.4 percent of the 1960 site sample (pl. 8, *g*, *h*).

DECORATION:

Lip/rim: This type is characterized by a lack of decoration on both of these areas. One rim is castellated (pl. 8, *h*).

Shoulder: One sherd retains traces of an incised shoulder pattern.

APPENDAGES: Two rims have small, plain, appliqued hemispherical tabs attached to the outer lip.

COMMENTS: The type Riggs Plain, as described from the Paul Brave Site by Wood and Woolworth (1964, pp. 16–19), included rims which had tool-impressed lips as well as rims lacking rim decoration. Since there was such a high percentage of decorated lips at Paul Brave, Lehmer favors reserving the term Riggs

Plain for rim sherds having no decorations of any sort, and using the term Riggs Decorated Lip for rims with lip embellishment. This proposal is accepted here.

There are only minor differences between the Riggs Plain from the Paul Brave Site and Riggs Plain and Riggs Decorated Lip from Huff: rim castellations are all but lacking at Huff (they were rare even at Paul Brave), and a few of the rims from Huff of the type Riggs Decorated Lip are lightly brushed—a technique wholly absent at Paul Brave.

RIGGS DECORATED LIP

SAMPLE: 101 rim sherds, 10.7 percent of the 1960 site sample (pls. 8, *e*; 9, *b*).

DECORATION:

Lip: Oval or circular punctates occur on the crest or outer margin of the lip of 24 sherds. The rest are decorated by oblique, transverse, or cross-hatched tool impressions.

Rim: Plain.

Shoulder: Many shoulders were incised with rectilinear patterns, but only one of them is distinct (fig. 2, *f,g;* pl. 9, *b*).

APPENDAGES: Small, erect and plain appliqued tabs occur on 3 sherds; 10 rims have small, horizontally projecting appliqued triangular tabs attached to the outer rim. Seven of the latter are decorated by an apical incision or by a continuation of the lip embellishment; 3 are plain.

COMMENTS: See Riggs Plain.

RIGGS FILLETED RIM

SAMPLE: 4 rim sherds, 0.4 percent of the 1960 site sample (pl. 8, *j*).

DECORATION:

Lip: Plain.

Rim: Punctates were horizontally applied along the fillet attached to the midrim.

Shoulder: Plain.

APPENDAGES: A plain, horizontally projecting triangular lug was attached to one of the fillets.

COMMENTS: This type is much the same as the type "Riggs Punctate," described by Kleinsasser (1953, p. 29) from the Thomas Riggs Site. However, not all of the sherds described as "Riggs Punctate" from Thomas Riggs have fillets, and filleted rims of this nature in other related sites do not always carry punctates. For this reason, the type Riggs Punctate is now defined to include flaring rims of the Riggs Ware which are punctated on the rim exterior just below the lip, while Riggs Filleted Rim consists of those Riggs Ware rims elaborated by a clay fillet applied just below the lip or in the midrim area (see Lehmer, 1966, pp. 30, 62).

FORT YATES WARE

SAMPLE: 235 rim sherds, 25.3 percent of the 1960 site sample.

SURFACE FINISH: See "General Characteristics"; some rims are lightly polished.

FORM:

Lip: Predominantly rounded, with a few flat examples; thickness, 3 to 8 mm.

Rim: Gently curving, low S-shaped rims of nearly equal thickness from the lip to the shoulder, with occasional instances of thickening or collaring near the base of the convex upper rim. These rims are low with respect to those of Le Beau Cord Impressed. The height of the convex upper part

of the rim is greater than or equal to the height of the concave lower rim. Total rim height, 28 to 62 mm.; thickness, 4 to 9 mm.

Neck: Constricted to various degrees, the rim joining the shoulder in a tight but smooth curve to a slightly angular curve.

Orifice: The orifices of 12 restored rim sections and estimates of the projections of the arc of large rims are:

109 mm.	180 mm.	199 mm.	218 mm.
164	188	208	221
175	194	216	297

FORT YATES CORD IMPRESSED

SAMPLE: 220 rim sherds, 23.4 percent of the 1960 site sample (pl. 7, *a–g*), and part of 317 unclassifiable cord-impressed rim sherds.

DECORATION:

Lip: Plain.

Rim: Three to ten lines of horizontal cord impressions occur on the upper rim; two rims are decorated with cord-wrapped stick impressions. The majority of the cord-impressed lines were made with cord having an S twist; a few rims, with cord having a Z twist. On many sherds, the decorated zone is interrupted by four equally spaced cord-impressed triangles, at the apex of which are usually small appliqued nodes. More rarely, there are nodes without triangles below them. The triangles are composed of two to four lines, and the base of the triangle is bounded by a single cord-impressed line or, less often, left open. The triangles are predominantly rectilinear, but a few of them are curvilinear or "rainbow" in appearance.

Shoulder: One shoulder pattern was recorded (fig. 1, *d*). Many of the shoulders were decorated, but the breakage of the rim from the shoulder generally left only traces of the pattern. Two shoulder patterns are illustrated by Howard (1962 b, figs. 8, *e–g*, and 23, *a*) which were not duplicated in the sample from the 1960 excavations.

APPENDAGES: Small applique nodes occur at the apex of most of the triangular elements, but they may be lacking.

COMMENTS: These rims extend the range of variation previously described for this type (Wood and Woolworth, 1964, pp. 20–21). The Huff rims are more evenly S-shaped, usually lacking the collar or thickening toward the lower part of the convex upper rim that was so prevalent at Paul Brave, the rim being of nearly equal thickness from the lip to the shoulder. The distinction between this type and Le Beau Cord Impressed lies in the fact that the height of the convex upper part of the rim is usually nearly equal to the height of the concave lower rim, while in the Le Beau rims the upper rim is less than the height of the concave lower rim. The only other differences between the Huff sample and that from Paul Brave is the somewhat greater number of cord-impressed lines on the Huff rims.

FORT YATES INCISED

SAMPLE: 14 rim sherds, 1.5 percent of the 1960 site sample (pl. 8, *a-c;* pl. 9, *h*).

DECORATION:

Lip: Plain.

Rim: The upper rim is incised or trailed with 4 to 9 horizontal lines. On four rims these lines were traced over lines that were first impressed with cord having a Z twist. These horizontal bands are interrupted on some sherds by trailed triangular elements composed of three oblique lines, at the apex

of which are small applique nodes. Three of the rims are incised below the triangle; two of them are not. One sherd, trailed over cord impressions, is illustrated (pl. 8, *a*), as well as an atypical incised rim (pl. 9, *h*).

Shoulder: Plain.

APPENDAGES: Small applique nodes are attached to some of the rims at the apex of the triangular element.

COMMENTS: See Fort Yates Cord Impressed for comments relevant to rim form. Lehmer's decision to lump the type Fort Yates Cross-Hatched with other incised S-shaped rims is accepted here, since there is no apparent temporal significance to the use of crosshatched incised lines on the type Fort Yates Cross-Hatched as it was defined by Wood and Woolworth (1964, p. 21) from the Paul Brave Site.

FORT YATES PLAIN

SAMPLE: 1 rim sherd, 0.1 percent of the 1960 site sample (pl. 9, *j*).

DECORATION: None.

COMMENTS: This type is the same as the unclassified Example D rims from Paul Brave (Wood and Woolworth, 1964, p. 22) and the "Riggs Plain" rims from the Thomas Riggs Site (Kleinsasser, 1953, p. 28). Sherds of this character continue to turn up in sites in the Northern Plains, and Lehmer and I feel it will be useful to formally recognize it as a type.

LE BEAU S-RIM WARE

SAMPLE: 106 rim sherds, 11.1 percent of the 1960 site sample.

SURFACE FINISH: See "General Characteristics"; some rims are lightly polished.

FORM:

Lip: Predominantly rounded, with a few flat examples; thickness, 3 to 7 mm.

Rim: Gently curving, high-S rims of nearly equal thickness from the lip to the shoulder, with only rare instances of thickening or collaring near the base of the convex upper rim. The rims are very high in contrast to those of Fort Yates Cord Impressed at Huff. The height of the convex upper part of the rim is less than that of the concave lower rim, while the convex upper part of the rim of Fort Yates Cord Impressed is nearly equal to the height of the concave lower rim. Total rim height, 26 to 87 mm.; thickness, 4 to 8 mm.

Neck: Slightly constricted, the rim joining the shoulder in a smooth to slightly angular curve.

Orifice: The projected arcs of 10 large rim sherds and restored rim sections are:

118 mm.	186 mm.	210 mm.
170	196	219
184	206	232
		297

LE BEAU CORD IMPRESSED

SAMPLE: 106 rim sherds, 11.1 percent of the 1960 site sample and part of 317 unclassifiable cord-impressed rim sherds. The type is illustrated herein only by figure 1, *c*. At the time the illustrations were prepared, Fort Yates Cord Impressed and Le Beau Cord Impressed were grouped under a single type. In choosing sherds for photography, none of the sherds now ascribed to Le Beau Cord Impressed were selected.

221-350—67——6

Decoration:

Lip: Plain.

Rim: The upper rim is decorated with 3 to 10 horizontally cord-impressed lines. This zone of decoration is interrupted on many sherds by cord-impressed erect triangles, four of which were equally spaced around the rim of some vessels. The cord used usually had an S twist; cord with a Z twist was rare. Small applique nodes are often attached to the rims at the apex of the triangular elements; rarely, there are nodes without triangles below them. The triangular elements are composed of two to four lines, and the base of the triangle is bounded by a single cord-impressed line or, less often, left open. A few of the triangular elements are curvilinear or "rainbow" in form, but most of them are rectilinear.

Shoulder: One incised pattern is known to be associated with this type (fig. 1, *c*). Many of the shoulders of this type were decorated, but breakage of the rim from the shoulder usually left little more than traces of the pattern.

Appendages: Most vessels of this type had small applique nodes attached to the rim above the triangular elements.

Comments: This type is based on the description of the "Le Beau Horizontal Cord Impressed" variety of the "Le Beau S-Shaped Rim" from the Swan Creek Site (Hurt, 1957, p. 41). At Swan Creek this type and variety was ascribed to "Le Beau Ware," an aggregation of types including those with flared, straight, and variously proportioned recurved or S-shaped rims.

It is proposed here that the type "Le Beau S-Shaped Rim" be elevated to a ware, here called Le Beau S-Rim Ware, and that the variety "Le Beau Horizontal Cord Impressed" be elevated to a type, here called Le Beau Cord Impressed, the name being shortened to exclude the term "horizontal" as a distinguishing characteristic. Objections to the latter name can be raised because Hurt (1957, pp. 38–39) has already named a flared rim type by this same term from the Swan Creek Site. However, rim form has been adopted as a ware criterion in the Northern Plains, and the flared rim "Le Beau Cord Impressed" should be subsumed under a different ware in the near future. The rim form involved in the Huff pottery here called Le Beau S-Rim Ware is sufficiently distinctive that it deserves ware status, for it is not an S-shaped rim in the sense that this term is now used. Rather, it can be roughly likened to an S-shaped rim in which the lower, concave part of the S is replaced by a high, nearly vertical neck. In effect, the upper curve of the rim has been displaced upward by the addition of a cylindrical neck.

The type as presently defined also includes what was originally called "Rygh Rainbow Corded" (Hurt, 1957, pp. 42–43) from the Swan Creek Site, as well as most of the rims of the type "Fort Rice Cord Impressed" from the Demery Site (Woolworth and Wood, 1964, pp. 100–101).

Stanley Braced Rim Ware

Sample: 160 rim sherds and 3 restored or restorable vessels, 16.9 percent of the 1960 site sample.

Surface finish: Conforms to the statements in the "General Characteristics" except that four rims of the type Stanley Tool Impressed are vertically or obliquely *brushed*, although the brushing is nearly obscured by horizontal smoothing. Some of the rims are lightly to well polished.

FORM:

Lip: Generally rounded, but may be pointed or flat as a result of decoration; thickness, 4 to 9 mm.

Rim: Vessels of this type have vertical to outflaring braced rims, the bracing having been produced by one of two techniques. In most cases, the crest of the rim is thickened by folding down a thin flap of clay over the outer rim, which was then smoothed down to create a slight thickening of the upper rim. In other cases, the bracing is more pronounced, for a clay fillet was added to the outer margin of the lip, creating a distinct thickening of the rim. In most cases it is impossible to tell from viewing the cross section which technique was used, owing to careful compaction and modeling of the rim, although the added fillet appears to be less common. Rim height, 18 to 63 mm.; thickness, 4 to 8 mm.

Neck: Constricted to various degrees, the rim joining the shoulder in a slightly angular curve on the more nearly vertical rims, and in a smooth curve on the outcurving rims.

Orifice: The orifices of 12 vessels were measurable or were estimated from the arcs of large rims or large rim sections:

90 mm.	182 mm.	215 mm.
99	196	223
179	206	238
180	210	336

STANLEY TOOL IMPRESSED

SAMPLE: 153 rim sherds and 3 restored or restorable vessels, 16.2 percent of the 1960 site sample (pls. 8, *f–k;* 9, *a, c, e*).

DECORATION:

Lip: Plain.

Rim: The decoration, applied to the outer rim just below the lip, consists of oval to circular punctates on 43 sherds, the rest being impressed with closely spaced oblique or transverse tool impressions. The lower rim is plain.

Shoulder: There were traces of several incomplete patterns.

APPENDAGES: Small, triangular, horizontally projecting lugs are present on or immediately below the lip of 25 rims. They are decorated with a continuation of, or a variant of, the rim embellishment (fig. 8, *k*).

COMMENTS: The range of Stanley Braced Rim Ware has been extended, on the basis of talks with Donald J. Lehmer, from the original type description (Lehmer, 1954 a, pp. 42–43), to include the braced rims from Huff. This has been done because there is no clear line of separation between the varieties from the type site in central South Dakota and such upriver varieties as those of Huff—every degree of transition exists between them. The technique of bracing the rim is such a distinctive trait that, in the rather confined area where it occurs, it is reasonable to assume that it represents a single concept of pottery manufacture. The Huff specimens assigned to this ware differ from the type specimens in these respects: The bracing is less conspicuous at Huff; there are lugs but no strap handles at Huff (but see the "Comments" under unassigned strap handles, below), although there are both lugs and strap handles in the type site; and there are only rare examples of brushed necks at Huff, and these are partly smoothed, in contrast to the prominent brushing on many Stanley Braced Rim Ware vessels. It is significant that no examples of Stanley Cord Impressed nor of Stanley Wavy Rim occur at Huff.

STANLEY PLAIN

SAMPLE: 7 rim sherds, 0.7 percent of the 1960 site sample (pls. 8, *d*, *i*; 9, *f*).
DECORATION: None.
APPENDAGES: None.
COMMENTS: See Stanley Tool Impressed.

MISCELLANEOUS UNCLASSIFIED

UNASSIGNED STRAP HANDLES

SAMPLE: 2 handles, 0.2 percent of the 1960 site sample (pl. 8, *l*).
PASTE: See "General Characteristics."
SURFACE FINISH: Both handles are roughly smoothed, the designs having been applied over a somewhat irregular surface.
FORM: They are both triangular in outline, with the broad end welded to the vessel lip and the small end riveted to the lower rim. Both were once attached to gently outflaring rims.
DECORATION: Both handles are incised with vertical and oblique lines, with a deep pit punched in the center.
COMMENTS: None of the majority wares at Huff carry handles of any description. The paste of the handles is the same as that of the rest of the Huff pottery, suggesting that they are not from imported vessels. Perhaps they are from vessels of Stanley Tool Impressed type, since they were attached to outflaring rims, and since strap handles are known for this type in other sites.

RIM EXAMPLE A

SAMPLE: 1 rim sherd, 0.1 percent of the 1960 site sample (pl. 9, *g*).
PASTE:
Temper: Grit, composed of granite particles from 1 to 3 mm. in diameter. Particles are larger and less abundant than in most of the Huff pottery.
Texture: Extremely fine, exceeding that of the majority of the site sample. Surfaces are medium fine, with a slightly sandy feel to the touch.
Hardness: 3.5.
SURFACE FINISH: The lower rim is horizontally smoothed, but retains traces of vertical simple stamps below the design.
FORM:
Lip: Flat; thickness, 4 mm.
Rim: S-shaped, with finger pinching at the point of maximum protrusion. Rim height, 50 mm.; thickness, 4 mm.
DECORATION:
Lip: Oblique tool impressions.
Rim: Vertically finger pinched in the midrim, with obliquely trailed lines above the pinching, and horizontally trailed lines below the pinching.
Shoulder: Traces of obliquely trailed lines remain.
COMMENTS: The paste, rim form and decoration clearly differentiate this rim from the rest of the Huff pottery. It closely resembles a rim from the Demery Site (Woolworth and Wood, 1964, pl. 13, *g*), and is assumed to be a trade piece from down the Missouri River.

RIM EXAMPLE B

SAMPLE: 1 rim sherd, 0.1 percent of the 1960 site sample (pl. 9, *i*).
PASTE: See "General Characteristics."
SURFACE FINISH: The neck was obliquely brushed, then horizontally smoothed.

FORM:

Lip: Flat; thickness, 5 mm.

Rim: Slightly outflaring. Rim height, about 50 mm.; thickness, 5 mm.

DECORATION:

Lip: Oblique tool impressions.

Rim: Three horizontally incised lines were high on the rim (this observation based on field notes, as the sherd crumbled on removal from the soil).

COMMENTS: The neck brushing, in conjunction with the horizontally incised lines, suggests a relationship to the type Nordvold Horizontally Incised (Wilmeth, 1957, pp. 44–45). The Huff rim, however, has a simple flat lip; the Nordvold rims generally have extruded lips.

RIM EXAMPLE C

SAMPLE: 1 rim sherd, 0.1 percent of the site sample (pl. 9, *k*).

PASTE: See "General Characteristics."

SURFACE FINISH: Although the impressions are too faint for positive identification, the rim was either vertically brushed or was cord roughened before it was smoothed.

FORM:

Lip: Flat; thickness, 6 mm.

Rim: Gently outflaring.

DECORATION:

Lip: Zigzag lines of alternating oblique, deep incisions.

Rim: Plain.

Shoulder: Traces of an incised design remain.

COMMENTS: This rim differs from other local types and examples, particularly if it is cord roughened, and not brushed.

RIM EXAMPLE D

SAMPLE: 2 rim sherds, 0.2 percent of the site sample (pl. 9, *l*).

PASTE: See "General Characteristics."

SURFACE FINISH: Horizontally smoothed.

FORM:

Lip: Flat; thickness, 6 mm.

Rim: S-shaped, with the rim thickest above the point of maximum protrusion. Rim height, 35 mm.; thickness, 6 to 10 mm.

DECORATION:

Lip: Plain.

Rim: Evenly spaced punctates on the upper rim.

Appendages: One rim has a small, horizontally projecting lug.

COMMENTS: This rim is unlike any previously described pottery from nearby sites.

UNCLASSIFIED CORD IMPRESSED RIMS

SAMPLE: 317 rim sherds, 32.6 percent of the 1960 site sample.

COMMENTS: These are unclassifiable fragments of the two cord-impressed types in the site, Fort Yates Cord Impressed and Le Beau Cord Impressed.

Body Sherds

All of the pottery from Huff recovered in 1960 appeared to have been modeled with a grooved paddle, resulting in a ridged surface generally termed simple stamped. The majority of the body sherds are classed as *simple stamped:* 2,381 sherds, or 63.0 percent of the

sample. Any sherd which retained traces of these stamps was classed as simple-stamped, even though smoothing had nearly obliterated the impressions, since virtually all vessels were smoothed to some degree. There were only rare cases where clear, clean paddle impressions remained unmarred by smoothing. The category of *smoothed* sherds is self-explanatory; they included 814 sherds, 21.6 percent of the sample. *Decorated* sherds are next in order of occurrence; there were 533 of them, 14.0 percent of the sample. They were incised, trailed, or punctated, and in all instances were from the vessel shoulder area. Three complete patterns were recorded (fig. 1, *a–c*), and parts of several others (fig. 1, *d–e*; fig. 2; pl. 9, *b*). These patterns and pattern fragments were carefully analyzed in an effort to illustrate the full range of variation found.

The distributions of these patterns and elements are plotted by house, and the number of fragments identifiable as to pattern or design element, as illustrated in figures 1 and 2, are recorded in table 12. The incentive for this tabulation was a statement by Bowers (1950, p. 62) that a Mandan girl made "crude pots when the women of the lodge were making pottery, and, when old enough, she bought her mother's rights in the techniques and designs of pottery-making." Only a few of the patterns—most of them fragments—were confined in their distribution to any one house. This pattern of distribution suggests that pottery inheritance, if it did pass rights to designs from mother to daughter, involved concepts of distinctiveness of pattern not recognized in the sorting; that is, what I regarded as an unimportant variation may have been a subtle variation "owned" by an individual. An alternative suggestion is that the patterns were in fact owned by a larger entity, probably the clan. Since clan members tended to build their homes near one another, we could expect that

TABLE 12.—*Frequency of pottery shoulder patterns*

Illustration	House									
	1	2	3	4	6	7	8	9	10	12
Figure 1, *a*			1	1						
b			1			1				1
c			2			2				
d			1							
e			1							
Figure 2, *a*	1	1	7		2	1	3		1	1
b					3					
c		1	1	1	1				2	1
d							1			
e							2			
f					1					
g					1					
h							1			
i						1	1			
j		1	6			2				

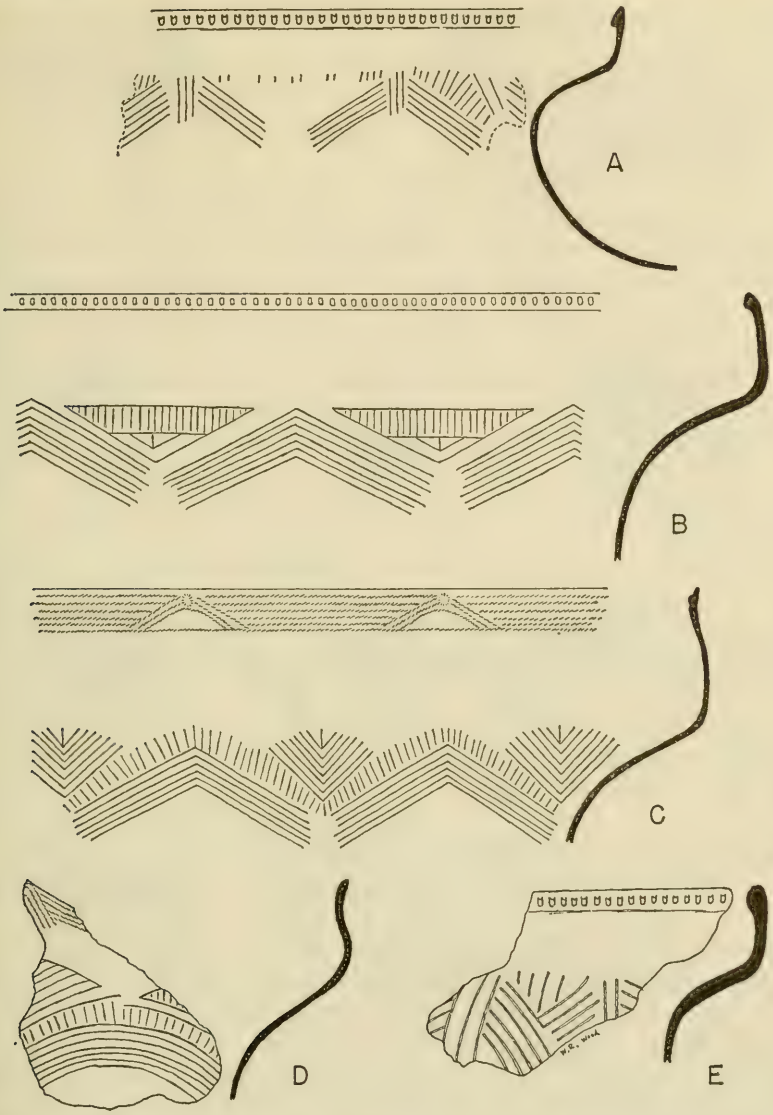


FIGURE 1.—Pottery shoulder patterns and elements (various scales).

houses close together would tend to contain the same patterns. The fragmentary nature of the patterns, however, prevents any really detailed presentation of their distribution.

There were 51 *red-filmed* sherds, or 1.4 percent of the sample. These sherds, including both simple-stamped and smoothed examples, were coated on their interiors with a thin film of red ocher. There

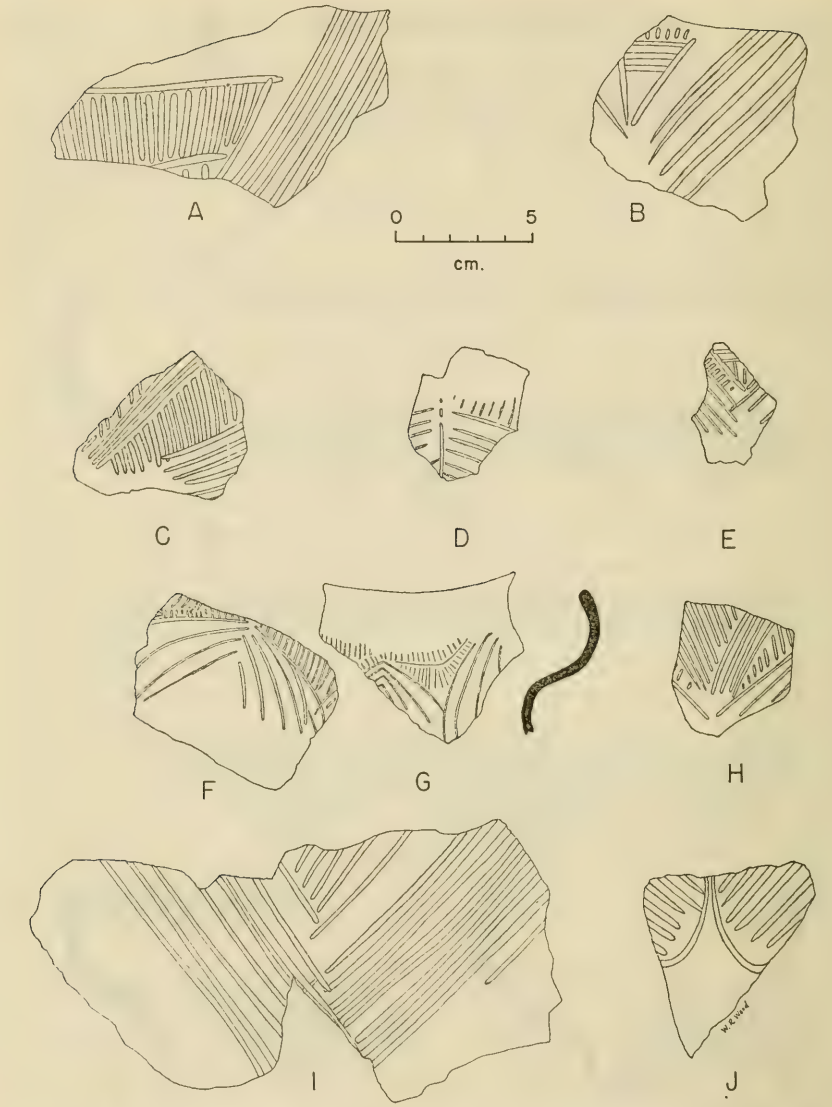


FIGURE 2.—Fragmentary pottery shoulder patterns and elements. *a,b,* "Bear foot" elements. *f,g,* Two sherds from the same vessel, juxtaposed in positions believed to approximate the continuation of the pattern. *c–e, h–j,* Other fragmentary patterns. Sherds are oriented so that the neck is toward the top of the figure.

was no trace of *cord-roughened* or of *check-stamped* sherds in any of the extensive 1959 or 1960 excavations, although Bowers (MS. b, p. 77) states that 1.2 percent of his sample from the site was check stamped.

Secondary uses for pottery included the manufacture of rough-shaped disks. One of them (pl. 9, *m*) is centrally pierced. The other piece is partly shaped, four edges having been smoothly ground.

CHIPPED STONE

PROJECTILE POINTS (88 SPECIMENS)

The first four of the seven classes of projectile points are small specimens made from thin flakes of gray chert and from Knife River chalcedony. They are usually bifacially flaked, although a few retain one surface of the original flake. Flaking is random. The basic form of these four classes is triangular, with straight to gently convex blade edges; their size suggests that they are arrowpoints.

1. *Triangular, straight base, two side notches* (22 specimens).—Lengths of complete specimens range from 20 to 33 mm.; widths, from 11 to 16 mm.; thickness, from 2 to 3 mm. (fig. 3, *a*).

2. *Triangular, concave base, two side notches* (17 specimens).—Lengths of complete specimens range from 24 to 34 mm. (with lengths of broken points estimated up to 40 mm.); widths, from 13 to 19 mm.; thickness, from 2 to 5 mm. (fig. 3, *b*).

3. *Triangular, straight base, unnotched* (18 specimens).—Lengths of complete specimens range from 20 to 40 mm.; widths, from 14 to 23 mm.; thickness, from 2 to 6 mm. (fig. 3, *c*).

4. *Triangular, concave base, unnotched* (7 specimens).—Lengths of complete specimens range from 24 to 27 mm. (with lengths of broken specimens estimated up to 40 mm.); widths, from 15 to 19 mm; thickness, from 3 to 4 mm. (fig. 3, *d*).

Triangular points lacking bases, no apparent side notches (15 specimens). These consist of unclassifiable point tips.

The following three classes of projectile points differ from the first four classes in being much larger and heavier than points generally regarded as arrowpoints. They may be dart points or knives.

5. *Lanceolate, straight base and sides, two side notches* (2 specimens).—These two broken artifacts are composed of light-gray quartzite and of dark-brown chert. The more nearly intact specimen (fig. 3, *f*) is now 49 mm. long, 25 mm. wide, and 5 mm. thick; originally it may have been twice as long. The base and the notches are smoothly ground. The smaller fragment, consisting only of the base broken through the side notches, is 39 mm. wide and 7 mm. thick; the base is not ground (fig. 3, *e*).

6. *Triangular, straight edges, irregular base, two side notches* (2 specimens).—The one complete implement, of Knife River chalcedony, measures 65×27×6 mm. The cross section is thickly lenticular; the base is thinned but is not ground (fig. 3, *j*). The base of

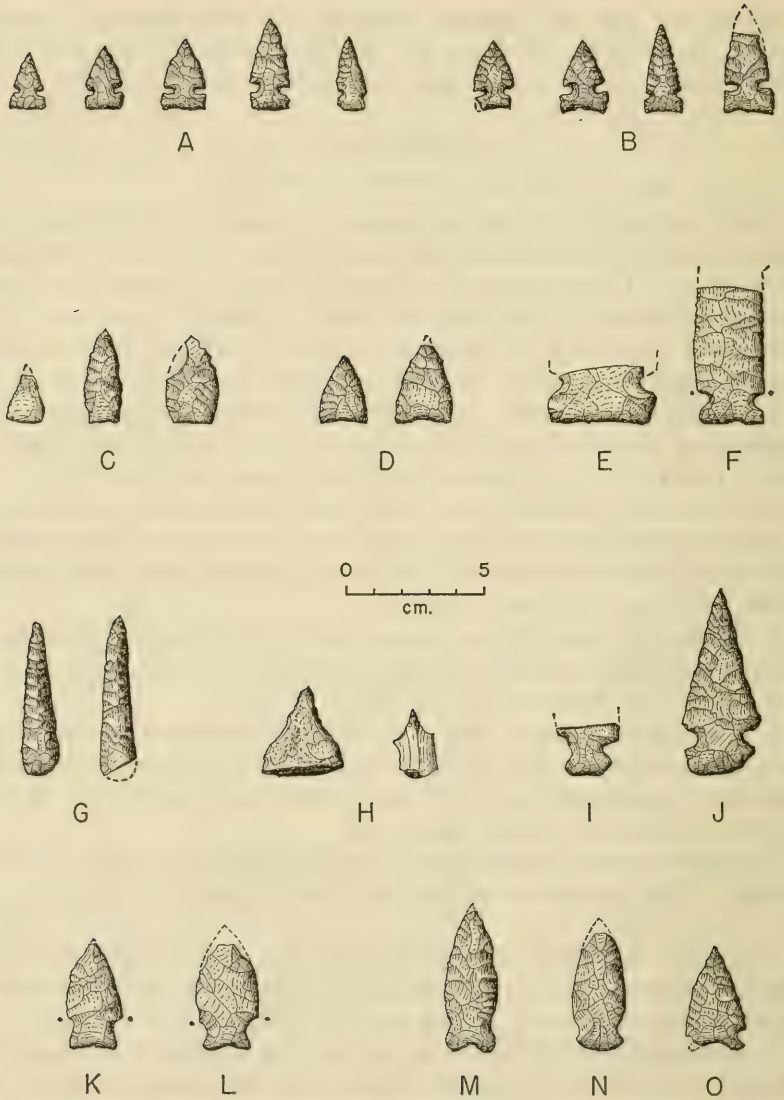


FIGURE 3.—Projectile points and drills. *a*, Triangular, side-notched arrowpoints with straight bases. *b*, Triangular, side-notched arrowpoints with concave bases. *c*, Triangular, unnotched arrowpoints with straight bases. *d*, Triangular, unnotched arrowpoints with concave bases. *e,f*, Large side-notched points. *g*, Straight-shafted drills. *h*, Expanding base drills. *i,j*, Large, triangular, side-notched points. *k,l*, Hanna points. *m–o*, Unclassified points. The dots above the notches denote the extent of basal grinding.

what appears to be a similar point is broken above the side notches (fig. 3, *i*).

7. *Miscellaneous points* (5 specimens).—Two of these points conform to the description of the Hanna point (Wheeler, 1954, pp. 8–9), and were identified as Hanna points by Wheeler (personal communication). One of them, lacking only the tip, measures 39×21×6 mm. (fig. 3, *k*). The other point, also broken, is 38×22×6 mm. The sides of the stem and base are smoothed (fig. 3, *l*). Both points are composed of Knife River chalcedony.

Three of the five miscellaneous points are of unnamed types. Each of them is side notched, the blade outline ranging from lanceolate to triangular. The lanceolate specimen (fig. 3, *m*) measures 50×19×7 mm. The cross section is lenticular, the base lacks grinding. Wheeler (personal communication) says that the form, finish, size, and proportions suggest that it may be contemporaneous with McKean, Duncan, and Hanna points (*i.e.*, Middle Prehistoric, Early Stage); it was made from Knife River chalcedony. The other two points (fig. 3, *n*, *o*) measure 42×20×8 mm. and 36×22×6 mm. The larger one is of gray chert, the other of petrified wood. Neither of them is smoothed on the base or sides, and both have lenticular cross sections. Wheeler states that the form, finish, size, and proportions of the specimens suggest that they postdate the Hanna points (*i.e.*, Middle Prehistoric, Late Stage).

STRAIGHT-SHAFTED DRILLS (5 SPECIMENS)

Long, thick flakes of gray chert and of Knife River chalcedony are bifacially flaked, with diamond-shaped cross sections, and have one blunt and polished tip. Shafts taper from a convex base toward the tip. Complete specimens measure 42×15×6 mm. and 54×13×6 mm. (fig. 3, *g*). One of them, with two side notches near the base, was probably hafted.

EXPANDING BASE DRILLS (4 SPECIMENS)

Irregular flakes of Knife River chalcedony with one pointed end were bifacially flaked to bring this point to a sharp tip, which has been polished by use. Maxium length, 42 mm. (fig. 3, *h*).

END SCRAPERS (165 SPECIMENS)

1. *Planoconvex scrapers* (136 specimens).—Each implement in this class was prepared from a planoconvex flake; the steep working edge is on the end opposite the bulb of percussion. The convex surface may be keeled, flaked, or irregular. They are subdivided as follows:

	Small tools	Large tools	Figure No.
Keeled, symmetrical working edge	12	-----	4, *a*, *b*.
Keeled, asymmetrical working edge	3	-----	4, *c*.
Keeled, with graver tip on working edge	1	-----	4, *n*.
Flaked or irregular upper surface, symmetrical working edge	93	11	4, *d*, *e*, *i*. 5, *j*.
Flaked or irregular upper surface, asymmetrical working edge	14	1	4, *f*–*h*.
Flaked upper surface, with graver tip on working edge	1	-----	4, *o*.
Total	124	12	

The implements were divided into "large" and "small" tools in order to distinguish between the smaller, better made implements and a number of coarse, heavy tools. Reference to the illustrations (figs. 4, 5) will best convey the distinction between these two overlapping categories. "Small tools" range from 17×16×4 mm. to 54×30×9 mm.; "large tools" range from 42×38×10 mm. to 84×46×24 mm. The material consists of light-gray chert and Knife River chalcedony.

2. *Bifacially flaked scrapers* (29 specimens).—These implements are bifacially flaked from light gray chert and Knife River chalcedony. Cross sections are evenly lenticular. Some of them appear to have been fashioned from knife tips or knife midsections, but it is altogether probable that they were initially made in their present form. As in the case of the preceding class of scrapers, this group is also divided into two categories on the basis of size. "Small tools" range from 20×18×6 mm. to 50×28×8 mm.; "large tools" range from 50×38×12 mm. to 80×52×15 mm. Three of them appear to be from knife midsections, and one of them (fig. 4, *l*) is notched for hafting. The remaining specimens—19 small tools and 7 large ones—have pointed or convex ends opposite the working edge, or are broken (fig. 4, *m*).

PLATE CHALCEDONY KNIVES (2 SPECIMENS)

Two plates of translucent chalcedony have been made into bifacially flaked knives. One of them, rectangular in outline, is flaked on two edges; it measures 75×32×6 mm. (fig. 4, *p*). The other is pointed on one end; it is 64×25×5 mm. (fig. 4, *q*).

BROAD KNIVES (104 SPECIMENS)

1. *Oval knives* (8 specimens).—Each of these oval to elongated knives is bifacially flaked, with thin lenticular cross sections. Sides are gently to strongly convex, and ends are rounded. Gray chert was used as the raw material. They range in size from 50×26×13 mm. to 146×73×17 mm. (fig. 4, *r*).

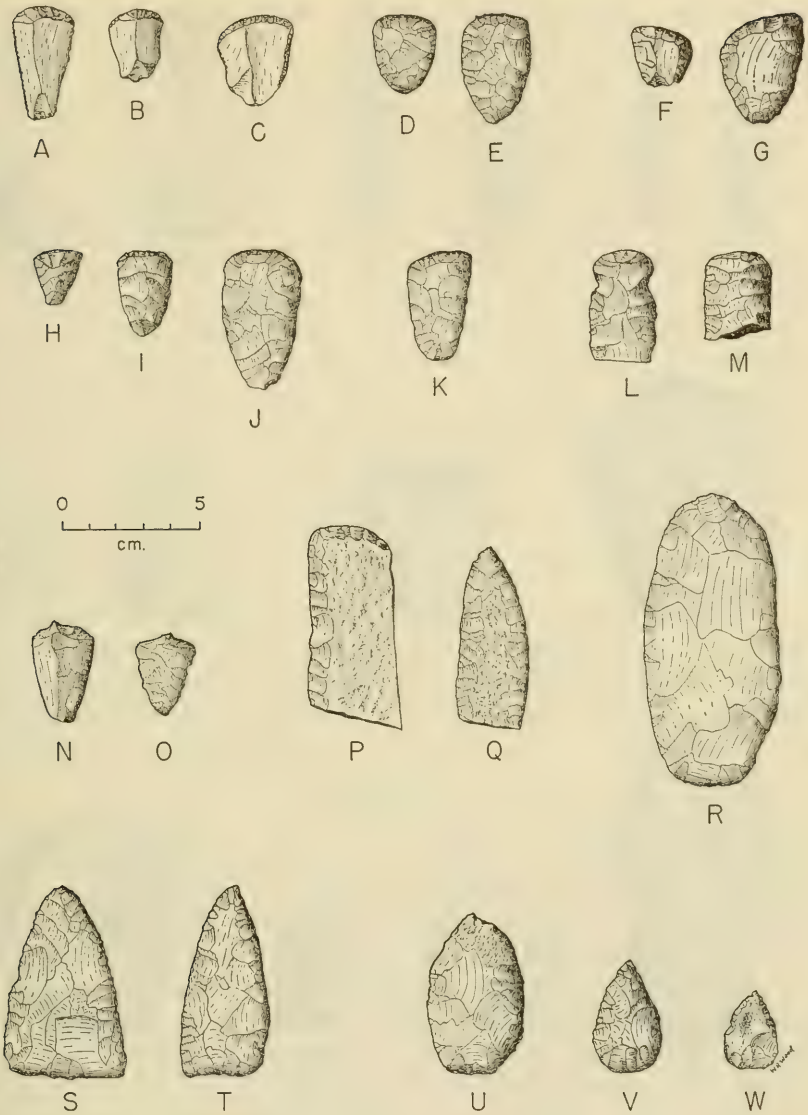


FIGURE 4.—Chipped stone artifacts. *a–g*, Planoconvex end scrapers. *h–m*, Bifacially flaked end scrapers. *n,o*, End scrapers with gravers on working edges. *p,q*, Plate chalcedony knives. *r*, Broad, oval knife. *s,t*, Broad, triangular knives with straight bases. *u–w*, Leaf-shaped knives.

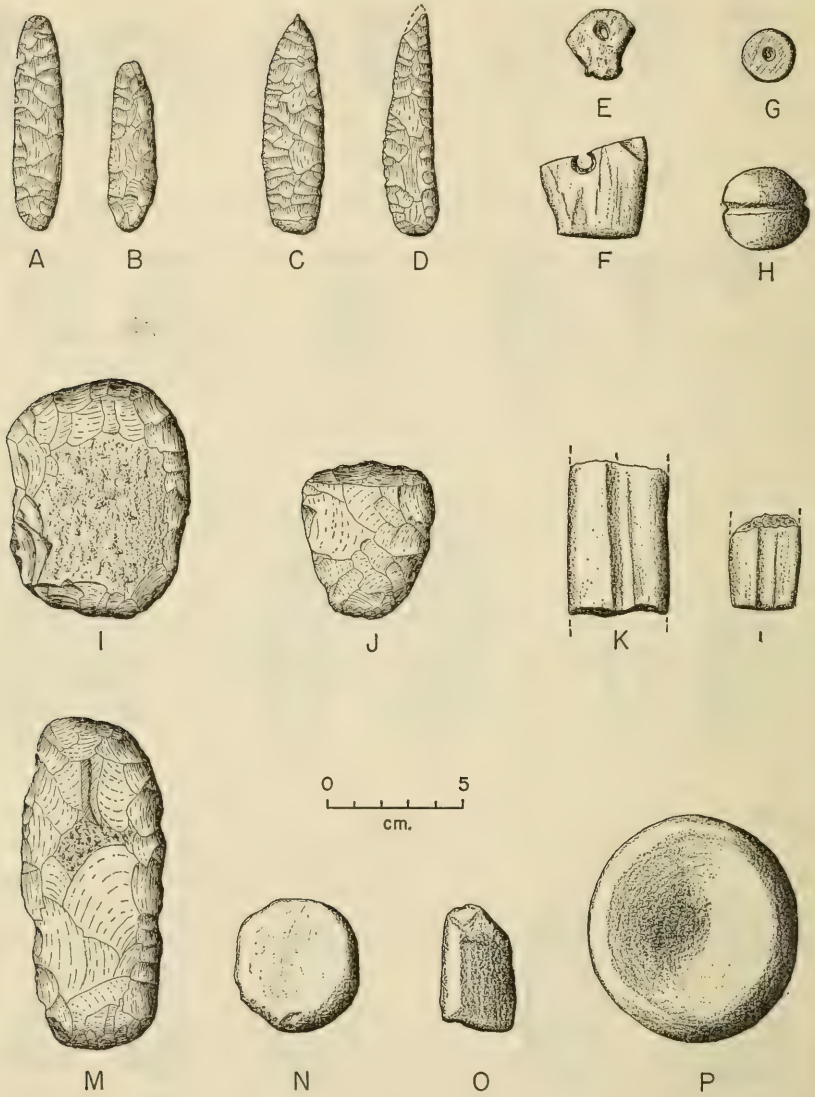


FIGURE 5.—Chipped and ground stone artifacts. *a,b*, Narrow, oval knives. *c,d*, Narrow, pointed knives. *e,f*, Pendants. *g*, Scoria bead. *h*, Grooved ironstone nodule. *i*, Large planoconvex end scraper. *j*, Large bifacially flaked end scraper. *k,l*, Sandstone shaft smoothers. *m*, Chopper. *n*, Sandstone game piece. *o*, Scoria abrader. *p*, Shaped mano.

2. *Triangular knives with straight bases* (10 specimens).—These knives, essentially triangular in outline, have gently convex edges, straight (but sometimes oblique) bases, and blunt tips. Material includes gray chert, Knife River chalcedony, and mottled gray chert. Only one of them is unifacially flaked. In size they range from 55×41×6 mm. to 126×38×12 mm. (fig. 4, *s, t*).

3. *Leaf-shaped knives* (21 specimens).—There is considerable variation in the size range of this class, with examples ranging from 29×29×4 mm. to as large as 101×33×8 mm., and it includes the smallest class of tools termed "broad knives." Some of the smaller implements are small enough to be classed as projectile points, probably arrowpoints, but their inclusion with knives is based on the lack of notching and upon the roughness of flaking and asymmetry of outline (fig. 4, *w*). Materials include gray chert and Knife River chalcedony, with rare use of mottled chert and translucent chalcedony. Specimens have distinctly convex blade edges, with evenly convex bases and sharp to predominantly blunt points. All are bifacially flaked. A sample of them is illustrated to depict the range in size and form (fig. 4, *u–w*).

4. *Broad knife fragments* (65 specimens).—Fragments of broken broad knives, none of them identifiable as to form, may be classed as follows: pointed ends, presumably tips, 22 specimens; straight ends and convex ends, presumably knife bases, 14 and 11 specimens, respectively; and midsections, 18 specimens.

NARROW KNIVES (57 SPECIMENS)

This class of knives differs from the preceding class in that they are elongated, narrow implements with more nearly parallel blade edges. There are two categories, based on blade outline, and each of them is bifacially flaked, with evenly lenticular cross sections. Material is gray chert and Knife River chalcedony. The flaking on them is finer and more regular than on the broad knives.

1. *Oval knives* (9 specimens).—These are exceptionally elongated oval knives with gently convex blade edges and convex ends. They range in size from 52×20×6 mm. to one exceptionally large implement 108×24×7 mm. (fig. 5, *a, b*).

2. *Leaf-shaped knives* (13 specimens).—This category tends to have gently convex to nearly straight bases, gently convex blade edges, and sharp to predominantly blunt tips—it is sometimes difficult to separate them from oval knives, for there is no clear break between them. Size ranges from 53×18×6 mm. to 91×19×7 mm. (fig. 5, *c, d*).

3. *Narrow knife fragments* (35 specimens).—Fragments of knives not classifiable as to form include pointed ends, presumably tips, 10

specimens; midsections, 10 specimens; and convex ends, either bases or tips, 15 specimens.

CHOPPERS (45 SPECIMENS)

Large flakes that have been bifacially percussion flaked to form oval tools are described as choppers. Gray chert was the preferred material; there is only one specimen of diorite, and one of Knife River chalcedony. These are all large tools with thick cross sections, roughly lenticular, and edges are even to predominantly irregular. There is little secondary finish flaking along the edges. They range in size from 95×57×16 mm. to 174×66×24 mm. (fig. 5, *m*).

MODIFIED FLAKES (404 SPECIMENS)

Irregular flakes and symmetrical blades, including a few ribbon flakes, were used as cutting and scraping implements without purposeful flaking except along the edge. They are divided into the following classes:

Flake scrapers (unifacially flaked)	279
Edges purposefully flaked	150
Edges retouched by use	129
Flake knives (purposefully, bifacially flaked)	125

The most popular stones were gray chert and Knife River chalcedony, with rare examples of petrified wood, translucent chalcedony, red chert, and dark mottled chert.

GROUND STONE

DIORITE CELTS (40 SPECIMENS)

Diorite celts, pecked and smoothly ground to shape, are subrectangular in outline, with one end ground to a sharp, wedge-shaped edge; polls are flattened and usually battered from use as a hammer. Cross sections are predominantly subrectangular, but four of them are oval in section. The cutting edges are about the same width as the maximum width, or slightly narrower, and are often battered. The size ranges from 100×55×39 mm. to 199×85×50 mm. (fig. 6, *f*). One atypical specimen has been slightly reduced in diameter between its midpoint and the poll (fig. 6, *e*).

DIORITE AX (1 SPECIMEN)

This pecked and ground ax is flatly oval in cross section, with one end ground to a wedge-shaped cutting edge, and with a convex, battered poll. A full groove encircles the ax near the poll. It was first pecked out, then ground smooth. The implement measures 174×66×24 mm. (fig. 6, *d*).

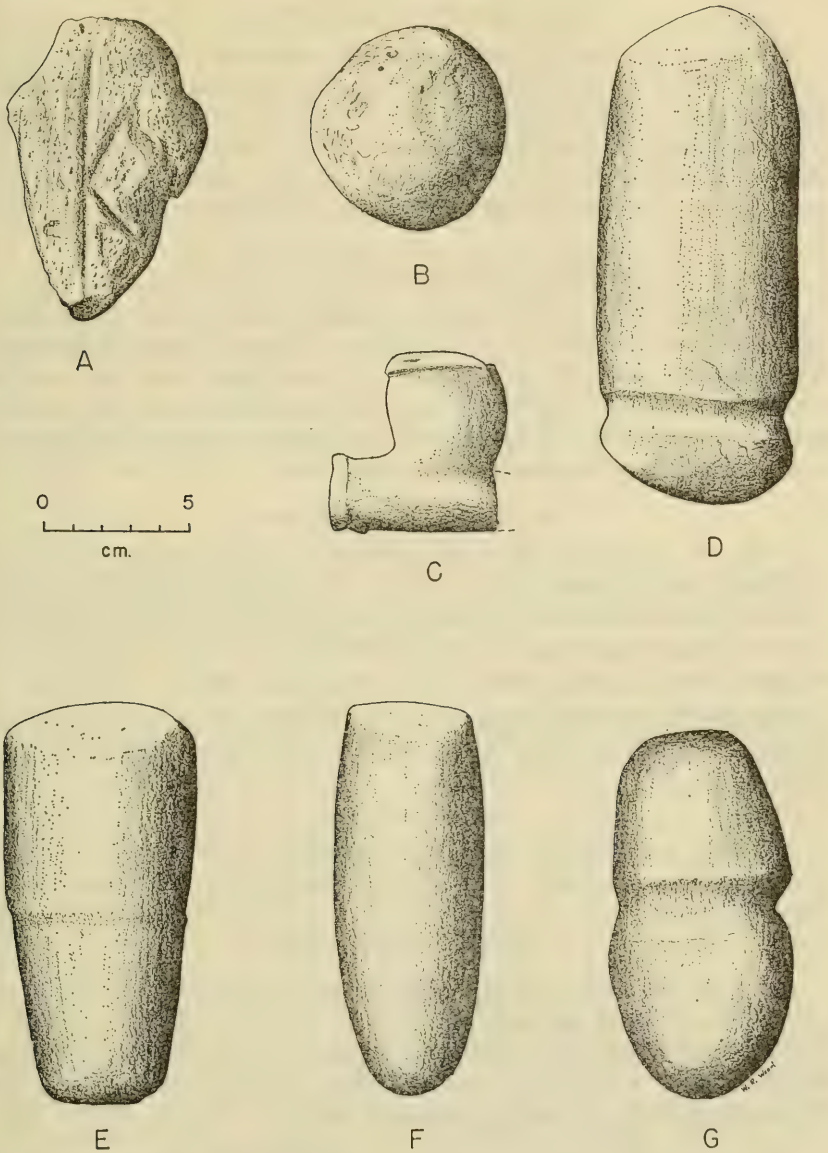


FIGURE 6.—Ground stone artifacts. *a*, Grooved abrader. *b*, Spherical hammerstone. *c*, Pipe. *d*, Diorite ax. *e,f*, Diorite celts. *g*, Grooved maul.

ARROWSHAFT SMOOTHERS (5 FRAGMENTS)

Boat-shaped blocks of a coarse-grained, light-brown sandstone have straight, symmetrical longitudinal grooves in their long axes. These grooves are shallow and U-shaped. The ends of the objects are straight or convex (fig. 5, *k, l*).

ABRADERS (41 SPECIMENS)

There are 12 slabs of coarse-grained sandstone, as much as 165 mm. long and 17 to 31 mm. thick, bearing irregular grooves on their flat surfaces. The grooves, U- and V-shaped, are of unequal depth. The remaining 29 implements are chunks of scoria, with maximum diameters of 110 mm.; they have one or more smoothly ground surfaces or are grooved along one or more flat surfaces (fig. 5, *o*; fig. 6, *a*).

GROOVED IRONSTONE NODULES (16 SPECIMENS)

Spherical nodules of ironstone, ranging from 35 to 62 mm. in diameter, are encircled by a full groove. The ends are not battered. The grooves are V-shaped cuts in 12 specimens, and are shallow pecked grooves in 4 others. Three of the nodules were in a group together near a sidewall in House 4, and elsewhere also they occurred most commonly along house walls (fig. 5, *h*).

GROOVED MAULS (24 SPECIMENS)

Oval to somewhat irregular granite pebbles, grooved at their midpoint, are battered on both ends. The only modification beyond grooving the implement by pecking and by battering the ends occurs on two implements which were pecked and smoothed to achieve a more regular form than was provided by the original pebble. There is one three-quarter grooved maul; the rest of them are full grooved (fig. 6, *g*). In size they range from 46×46×37 mm. to 165×137×108 mm.

ANVIL (1 SPECIMEN)

A large, oval granite cobble, measuring 154×151×75 mm., is pitted on one flat face. The shallow, basin-shaped pit was pecked into the stone.

METATES (23 SPECIMENS)

Irregular to rectangular slabs of coarse-grained sandstone or granite were used as mealing stones. One side bears a shallow trough with longitudinal striations; manos were frequently located beside them. They were most common along the sidewalls of the houses (e.g., maps 8 and 11, Houses 4 and 7).

SHAPED MANOS (8 SPECIMENS)

All of these implements are made from granite pebbles. Two of them, rectangular in form, are fully shaped, with all surfaces evenly finished. One of them measures 82×72×53 mm.; the other, 105×70×56 mm.

There are also six discoidal pebbles with evenly convex edges, battered and pecked into oval to circular form. There is a shallow depression pecked into one of the two flat faces. Surfaces are

smoothed, and flat surfaces striated. Size ranges from 84×82×47 mm. to 113×99×54 mm. (fig. 5, *p*).

HAMMER MANOS (19 SPECIMENS)

Granite pebbles, oval in shape, are ground smooth on one or more faces, and are battered on one or both ends or along their edges. They range from 70×66×29 mm. to 109×85×67 mm.

BATTERED SPHERE HAMMERS (14 SPECIMENS)

Thirteen gray chert cores, and one ironstone nodule, were evenly battered on all surfaces, resulting in a nearly spherical form. Diameters range from 52 to 101 mm. (fig. 6, *b*).

PEBBLE HAMMERSTONES (25 SPECIMENS)

Granite pebbles, from 50 to 94 mm. in diameter, were used as hammers on either or both ends, or on their sides, without further shaping.

GAME PIECE (1 SPECIMEN)

A thin disk of fine-grained sandstone, 49 mm. in diameter and 13 mm. thick, was roughly shaped by grinding both flat faces and by pecking and grinding the edges (fig. 5, *n*).

BEADS (4 SPECIMENS)

Three large and one small disk beads were made from dense scoria; they were pierced from both sides. The three large beads average 18 mm. in diameter and 8 mm. in thickness (fig. 5, *g*); the small bead is estimated to have been 10 mm. in diameter and 6 mm. thick.

PENDANTS (2 SPECIMENS)

One rectangular, broken piece of dense scoria (fig. 5, *f*), and a small, irregular piece of very dense buff clay (fig. 5, *e*) have been pierced for suspension.

PIPE (1 SPECIMEN)

This broken specimen was recovered by Thad. Hecker in House 18 during fieldwork in 1939. The illustration (fig. 6, *c*), prepared from photographs, depicts this gray sandstone pipe. It is now 63 mm. long (the prow is absent), 63 mm. high, and 38 mm. wide. The orifice of the bowl is 30 mm. in diameter.

BONE

(SCAPULA HOES 180 SPECIMENS)

This most common of bone implements was fashioned from bison scapulae that were modified only by the removal of the spine and posterior border in order to obtain a flat working surface. The glenoid is intact and there is no apparent notching on the blade edges. Size

varies considerably, depending on the original size of the scapula and upon the amount of use, since dull hoes were resharpened until they were quite short. Ends of the hoes are usually straight when they are sharp (fig. 7, *e*), but the duller blades are convex. Two hoe fragments are pierced near the blade edge (fig. 10, *d*).

HORN CORE-FRONTAL BONE SCOOPS (19 SPECIMENS)

The proximal ends of bison horns and adjoining parts of the frontal bone were hacked from the skull and fashioned into scoop-shaped implements. Interior surfaces are concave and could have accommodated a handle; all of them are grooved along their edges. These grooves could have been used for securing the tool to a handle, but they also provide very comfortable handgrips. The blade edge is generally dull and much worn (fig. 7, *d*).

SCAPULA KNIVES 16 (SPECIMENS)

Six of these implements are polished, rectangular sections cut from thin sections of bison scapulae. One edge retains traces of a reduced scapular spine, and the opposing edge is sharpened. Lengths range from 119 to 196 mm.; widths, from 74 to 95 mm. (fig. 8, *h*).

Elongated, generally convex-edged slivers of scapula are also classed as knives when one or both edges are sharpened. Such tools rarely retain any part of the scapular spine, and surfaces are smooth to glossy; one end of the tool is generally pointed (fig. 8, *d*). One of them is hook-ended (fig. 8, *c*). Lengths range from 125 to 186 mm.; widths, from 29 to 44 mm.

SHAFT WRENCHES (8 SPECIMENS)

One or two holes occur in large ribs. None of the tools are intact, and most of them are broken through the perforations. The holes are consistently oval, with the edges of the hole beveled. In each instance the beveling is most pronounced on the long axis of the tool. A pencil inserted in these holes and inclined along the long axis lies flush on the beveled edges on opposing sides of the hole. This circumstance lends support to the suggestion that they are, in fact, "shaft wrenches." It is likely that thong-stropping would have created a somewhat less symmetrical hole. Lengths of the total implement were in excess of 180 mm. Four of them are decorated. One is simply incised along the edges; on another, two incised lines form an "X" on one side. Two others are illustrated (fig. 8, *e, f*) that depict anthropomorphic designs.

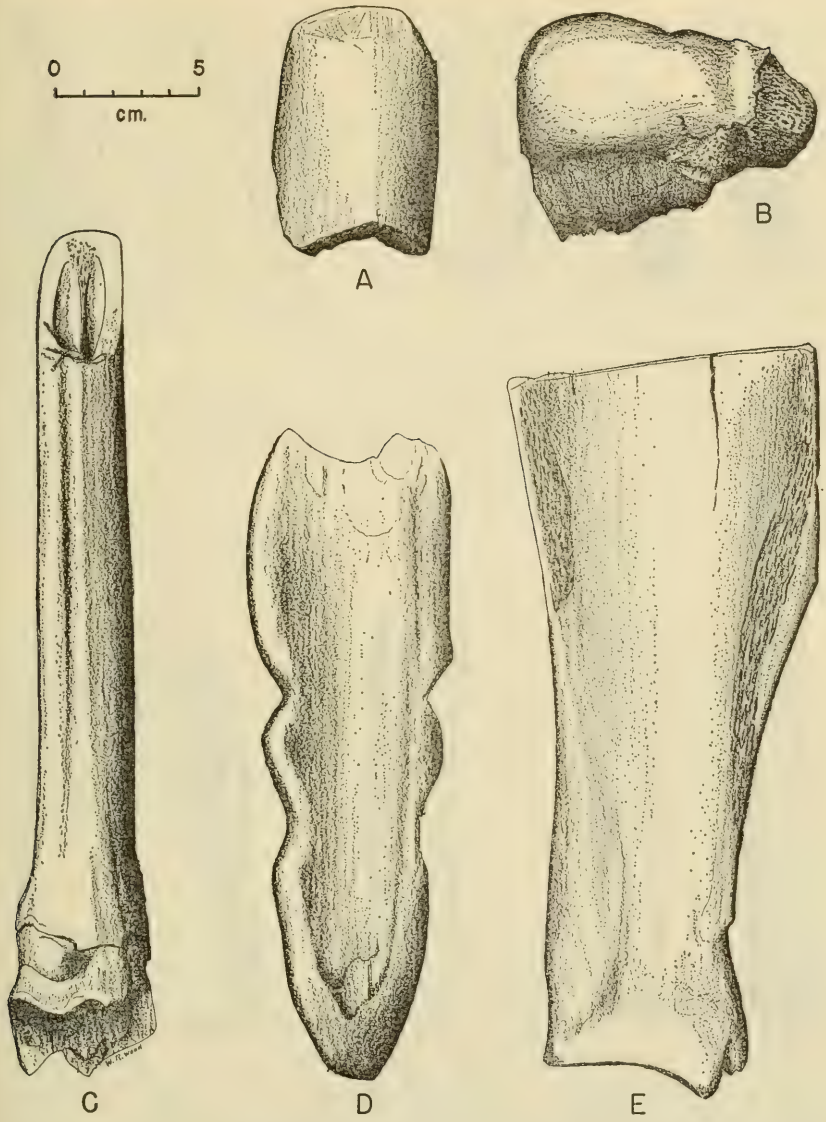


FIGURE 7.—Bone artifacts. *a*, Bison humerus gouge. *b*, Bison humerus abrader. *c*, Cannon bone flesher. *d*, Bison horn core-frontal bone scoop. *e*, Scapula hoe.

CANNON BONE FLESHERS (2 SPECIMENS)

The cannon bones of elk were used with some of the anklebones in articulation, presumably held in place by the ligaments and skin, while the middle of the shaft of the bone was cut and worked into a

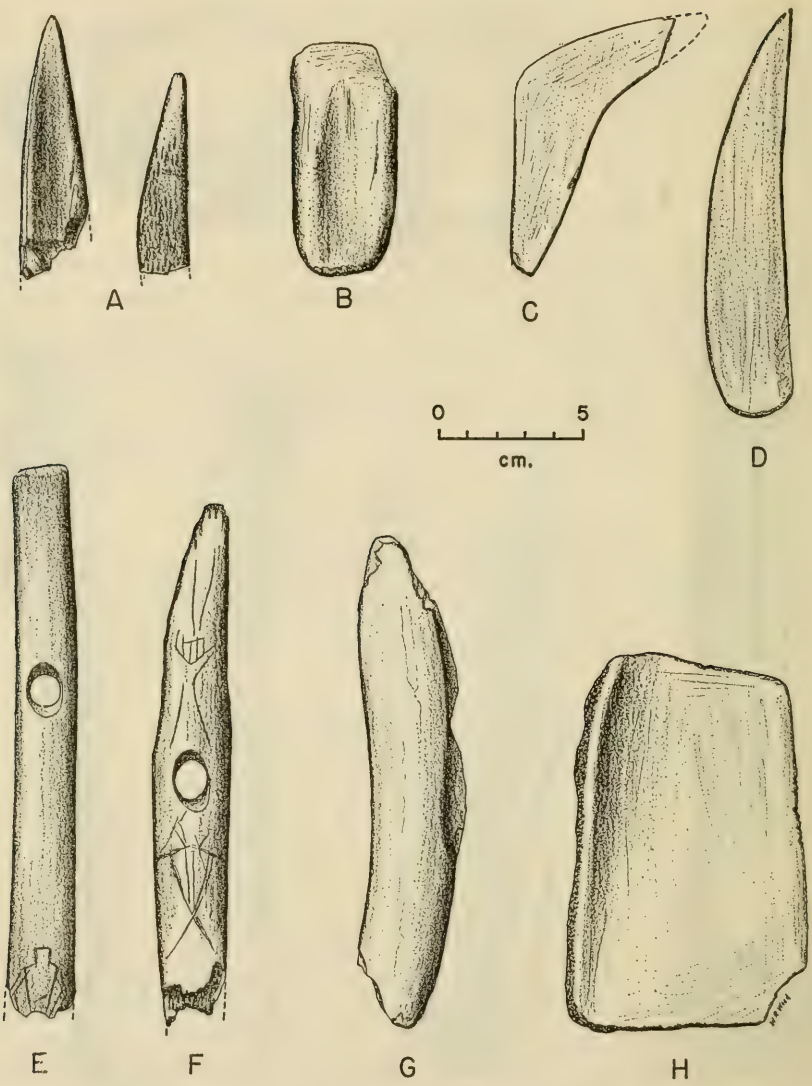


FIGURE 8.—Bone artifacts. *a*, Punches. *b*, Chisel. *c*, Hook-ended scapula knife. *d*, Elongated scapula knife. *e,f*, Embellished arrowshaft wrenches. *g*, Polisher. *h*, Rectangular scapula knife.

rounded blade. The most complete specimen is 295 mm. long; the blade edge is beveled but not serrated (fig. 7, *c*). The fragments of another specimen bear V-shaped serrations on the blade.

BIRD BONE TUBES (2 SPECIMENS)

Both of these items, probably ornaments, are broken. One of them, split in half, is 44 mm. long; the other was originally more

than 65 mm. long. Both are lightly polished but their ends are not smoothed.

BISON HUMERUS ABRADERS (5 SPECIMENS)

The cancellous tissue in the bison humerus cap served as a hide grainer or thinner when the cap was removed from the shaft and the side opposite the broad articulating surface was smoothed. There is a gradation in size according to the amount of work done to bring them to shape. The largest, and perhaps least-used implement is illustrated (fig. 7, *b*), but others no longer retain any of the outer compact bone layer.

BONE AWLS (103 SPECIMENS)

The following classification of the bone awls follows that of Kidder (1932), with modifications as necessary:

Mammal long bone		82
Head of bone left intact	2	
Head of bone unworked, split	19	
Head of bone partly worked	39	
Head of bone removed	12	
Splinter awls	2	
Unclassifiable tips	8	
Mammal rib awls		6
Mammal scapula splinter awl		1
Bird long bone awls		13
Head of bone left intact	10	
Head of bone removed	1	
Splinter awls	2	
Needle (?)		1
Total		103

MAMMAL LONG BONE AWLS (82 specimens):

Head of bone left intact (2 specimens).—One of these, part of the metapodial of an immature deer, has a detached epiphysis; it is 84 mm. long (fig. 9, *a*, *right*). The other, made from the distal end of a canid tibia, is 113 mm. long. Near the tip the bone is glossy, but the butt is rough, suggesting that it may have been covered with hide (fig. 9, *a*, *left*).

Head of bone unworked except by original splitting (19 specimens).—All of these seem to be made from deer metapodials, the bulk of them (12) fashioned from the proximal ends. They are from 65 mm. to more than 164 mm. long. The seven awls made from the distal end are 67 to 132 mm. long; most of them are short and stubby, with sharp tips (fig. 9, *b*).

Head of bone partly worked down (39 specimens).—Specimens of this class are also made from deer metapodials, and, again, the prox-

imal end is more popular (24 instances). Lengths range from 46 to more than 145 mm. (fig. 9, *c*).

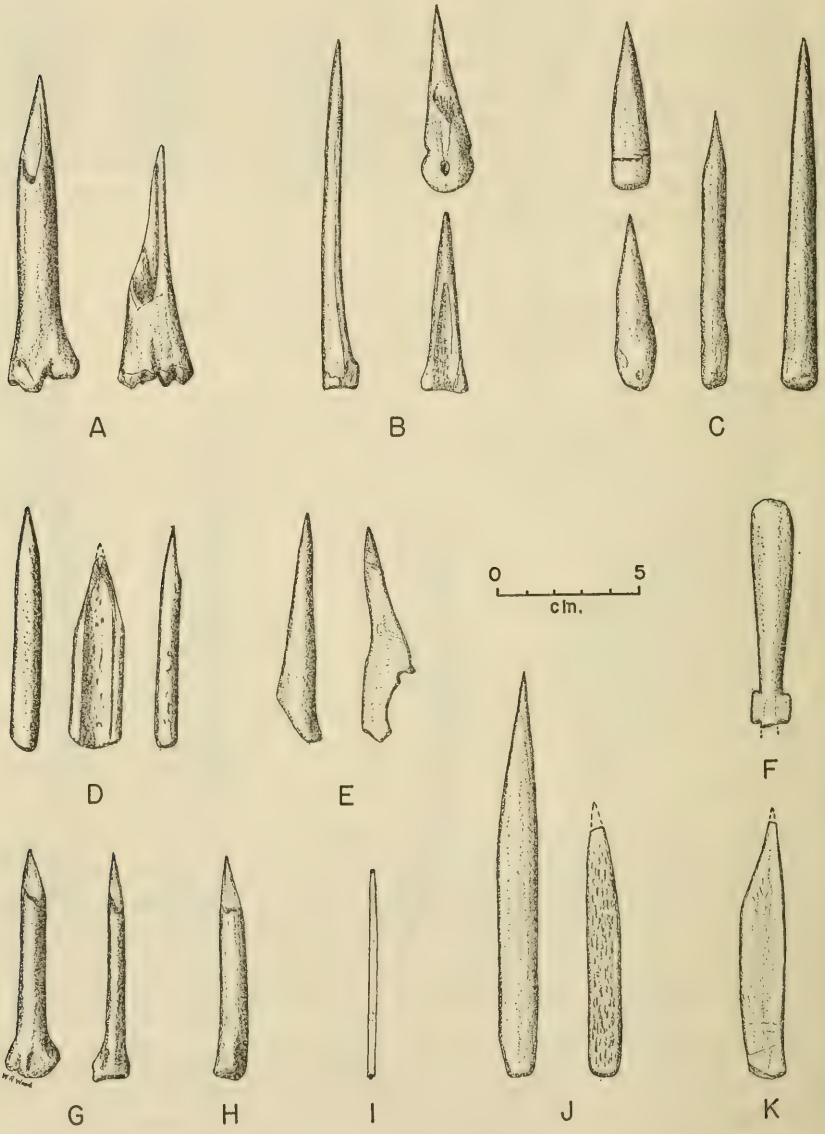


FIGURE 9.—Bone awls and a spatulate. *a–e*, Awls of mammal long bones. *a*, Head of bone left intact. *b*, Head of bone unworked except for original splitting *c*, Head of bone partly worked down. *d*, Head of bone removed. *e*, Splinter awls. *f*, Spatulate. *g,h*, Bird long bone awls. *i*, Needle form. *j*, Split mammal rib awls. *k*, Mammal scapula splinter awl.

Head of bone removed (12 specimens).—These awls cannot be certainly identified as to the source bone, but most of them appear to be made from deer metapodials, although some are obviously from larger and heavier bones. Lengths range from 52 to 167 mm.; points are sharp and tapered (fig. 9, *d*).

Splinter awls (2 specimens).—These are made from irregular bone splinters, one pointed end having been ground to a sharp point (fig. 9, *e*).

Unclassifiable tips (8 specimens).

Mammal rib awls (6 specimens):

Large ribs, probably from bison, were split, and the midsections fashioned into broad, flat awls with sharply tapering tips and rounded butts. The cancellous tissue is removed and the bone is smoothed; lengths range from 95 to 144 mm. (fig. 9, *j*).

Mammal scapula splinter awl (1 specimen).—This awl is made from a splinter of the scapula of a large animal, perhaps bison. One end is ground to a point; the length is 90 mm. (fig. 9, *k*).

Bird long bone awls (13 specimens):

Head of bone left intact (10 specimens).—Proximal and distal ends of bird ulnae, radii, and tibiae were made from the whistling swan, golden eagle, whooping crane, and great horned owl (?). One articular end is intact on each; the center of the shaft was brought to a very sharp point. Lengths range from 53 to 156 mm. (fig. 9, *g*).

Head of bone removed (1 specimen).—This section of unidentified bone is 79 mm. long; the tip is quite sharp (fig. 9, *h*).

Splinter awls (2 specimens).—These splinters, 75 and 126 mm. long, have very sharp tips; butts are not smoothed.

Needle (?) (1 specimen):

This unusual specimen, made from compact bone with no cancellous bone remaining, may be a small awl or a needle. It is now 74 mm. long (both ends are gone) and is 2 mm. thick. The shaft is square in section, but toward the small end it is circular (fig. 9, *i*).

GAME PIECES (22 SPECIMENS)

These are rectangular pieces of bone cut from the wall of long bones of large mammals, probably bison, with symmetrical outlines and smoothed edges. Some of them, perhaps unfinished pieces, have battered edges and show marks of transverse sawing. The largest (and unfinished) specimen is 72×48×7 mm.; the smallest and finest piece is 42×32×6 mm. The convex outer surfaces are glossy and polished, and the inner surfaces are smoothed so that cancellous tissue is nearly obliterated (fig. 10, *b*). Six of them are pierced or decorated with incised lines. Holes were made by drilling from both sides with a conical drill. Five of the six embellished pieces are illustrated (fig. 10, *a*).

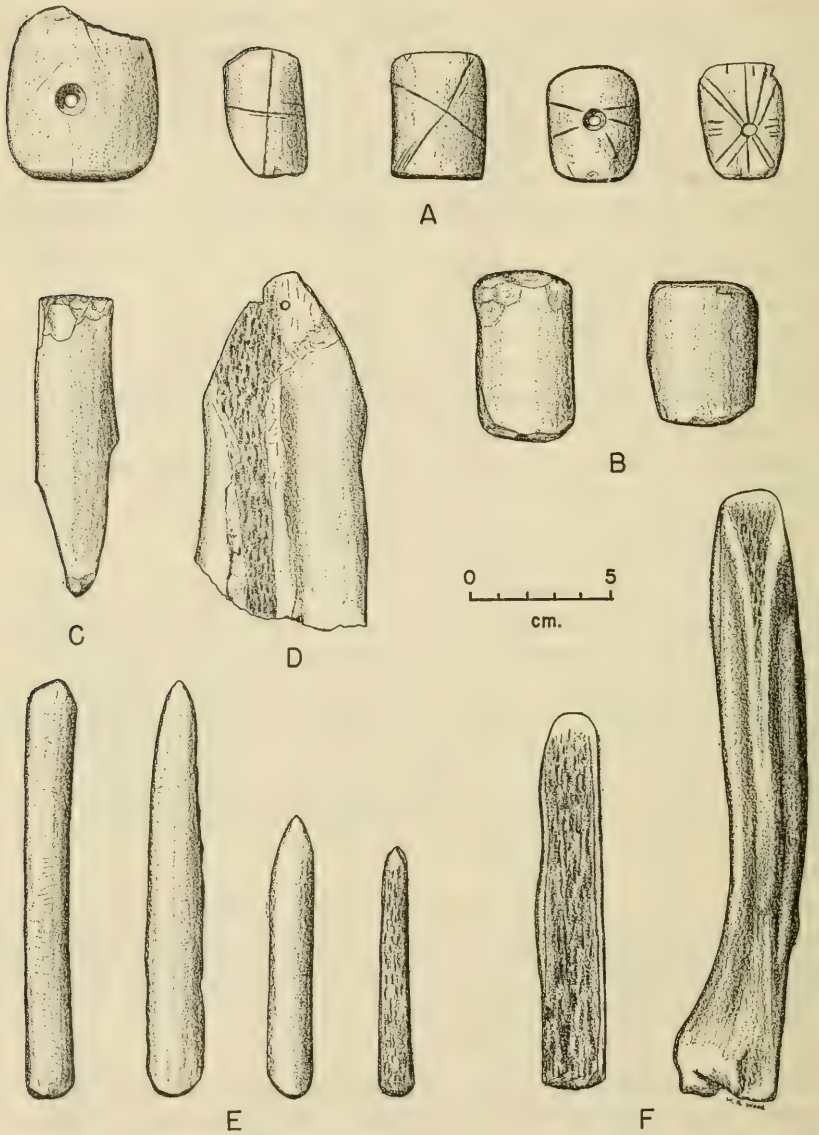


FIGURE 10.—Bone artifacts. *a*, Embellished game pieces. *b*, Plain game pieces. *c*, Bifacially flaked bone. *d*, Pierced scapula hoe (?) fragment. *e*, Pottery modeling tools. *f*, Scapula chisels.

POTTERY MODELING TOOLS (41 SPECIMENS)

These implements were made from split midsections of heavy ribs. The outer surfaces are smooth but rarely polished or glossy; the cancellous tissue is smoothed and nearly obliterated. Sides are smooth and straight to irregular. There is much variation in size

and form among them, but it was not feasible to divide them into distinctive subclasses. By and large, they consist of tools that are rounded on both ends, merging with specimens that are rounded on one end and pointed on the other, with no clear break between these forms. None of them are decorated. Lengths of complete specimens, 68 to 275 mm. (fig. 10, *e*).

BIFACIALLY FLAKED LONG BONE SECTIONS (2 SPECIMENS)

Both of these objects were fashioned from midsections of large mammal long bones. One of them is complete: it is 106 mm. long, 29 mm. wide, and 10 mm thick. One squared end was shaped by bifacial percussion flaking; the other end is smooth and rounded. Their function is unknown (fig. 10, *c*).

CHISELS (9 SPECIMENS)

Sections of large mammal long bones, articular ends of bison scapulae, and scapula fragments were made into chisels. These tools are not finished except for a carefully prepared chisel edge on the smaller end of the bone. One side of the blade is beveled. Articular ends are retained only in the case of two bison scapulae; the other implements were used without specially preparing the butt or they are broken (fig. 10, *f*). One intact specimen with a sharp chisel edge is battered on one end from hammer blows heavy enough to detach large flakes of bone (fig. 10, *f*, *left*).

SPATULA (2 SPECIMENS)

One section of what appears to be a mammal long bone has two small "wings" on the end opposite the spatulate end. It is 82 mm. long; surfaces are glossy (fig. 9, *f*). Another less elaborate specimen has one spatulate end and the other is battered. It is made from long bone, is highly polished, and is 63 mm. long.

POLISHERS (9 SPECIMENS)

Segments of bison scapulae and midsections of large mammal ribs and long bones have one pointed end which is ground to a dull finish. These ends are faceted and are occasionally lightly striated. In three instances the end opposite the point is battered. Lengths range from 162 to 198 mm. (Fig. 8, *g*).

PUNCHES (6 SPECIMENS)

These tools resemble awls in some particulars, but their blunt tips distinguish them from awls. Three are long bone splinters with one pointed end ground to a blunt tip; one is a midsection of a large rib with one worked end; and two others are tips broken from split rib tools. Butts are either broken or were not specially

prepared; lengths of the larger and not obviously broken tools range from 128 to 152 mm. (fig. 8, *a*).

BISON HUMERUS GOUGE (1 SPECIMEN)

A rectangular section of bone from near the proximal end of a bison humerus provided the raw material for this tool. One end was hacked away and ground to a sharp edge; the butt is rough and may be broken. The sides are battered and rough and there are shallow notches which would have been convenient for lashing down a handle. The length is 89 mm. (fig. 7, *a*).

MISCELLANEOUS BONE TOOLS (5 SPECIMENS)

These items, found sketched in Thad. Hecker's notebook from House 5, have been redrawn here (see fig. 12, *a–c*). Except for the bone tubes or beads they are not readily identifiable, although item *c* may be a fishhook blank.

ANTLER

SCRAPER HAFT (1 SPECIMEN)

An L-shaped scraper haft, made from the brow tine of elk, is 311 mm. long, with a maximum diameter of 49 mm. at the grip. The end used to attach the scraper is fragmented and the inner surface of the short arm is unmodified. The handle is smoothed, and there is a lightly incised groove encircling the handle at the midpoint (fig. 11, *i*).

BRACELETS (13 SPECIMENS)

Five broad, flat bracelets were made from thin strips of antler. Four of them are embellished; none of them is intact. Ends, when present, are pierced from both sides by a conical drill. The convex sides are smooth to glossy; the concave surfaces are scored by parallel striations remaining from the shaping process. The bracelets are 13 to 38 mm. in width, 2 to 4 mm. in thickness. The largest one is lightly incised with the body of a bird (fig. 11, *a*); two others are scored along the edges (fig. 11, *c*, *d*); and the other is engraved with part of an arrow-shaped element (fig. 11, *b*).

Eight segments of bracelets are oval to rectangular in cross section; none is decorated. Seven ends are pierced for attachment from both sides with a conical drill, and one is scored for attachment. The most slender one (fig. 11, *f*) is carefully smoothed on all surfaces, while the others are less carefully finished (fig. 11, *g*). Diameters are 4 to 10 mm.

BARREL-SHAPED ANTLER TOOLS (6 SPECIMENS)

Short, cylindrical segments transversely cut from near the butt or from the midsection of large deer antlers may be rubbing tools. One end is smoothed and gently convex, while the other is unfinished

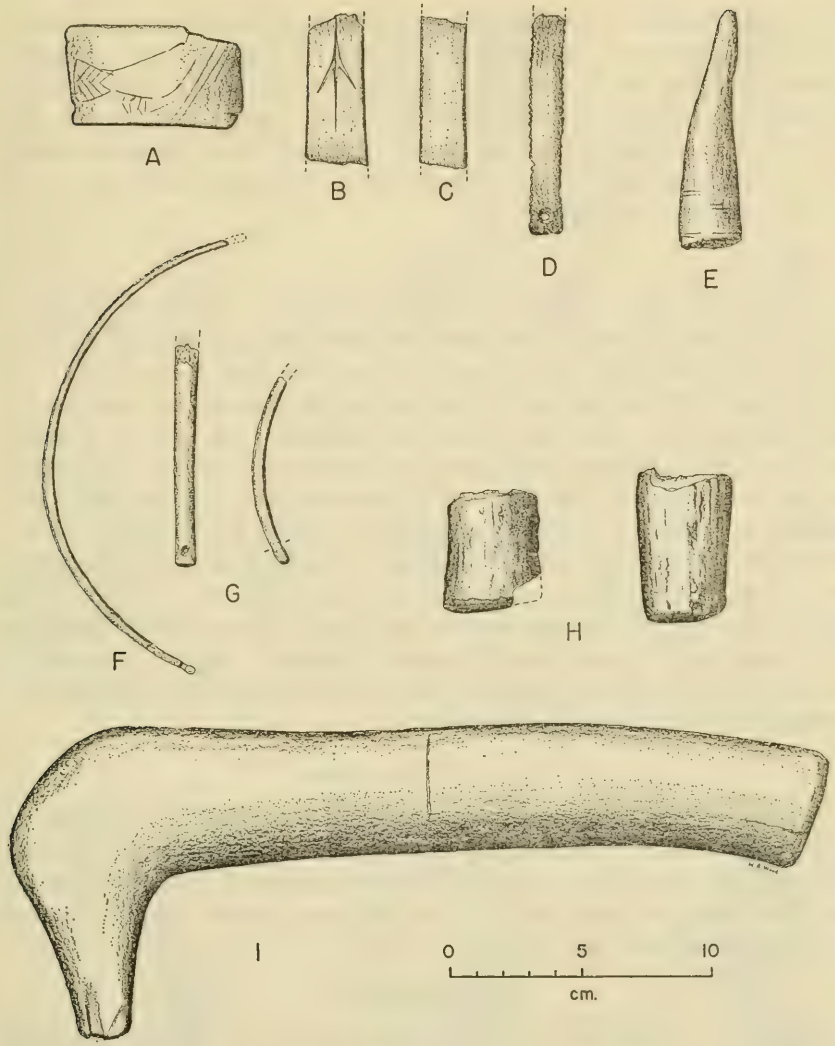


FIGURE 11.—Antler artifacts. *a–d*, Broad bracelets. *e*, Tine flaker. *f,g*, Narrow bracelets. *h*, Barrel-shaped rubbing tools. *i*, L-shaped scraper haft.

on each complete specimen. Three of the convex ends are pitted as though they had been used for pestles. Intact specimens range from 46 to 58 mm. in length, but larger and fragmentary examples attain lengths in excess of 78 mm. (fig. 11, *h*).

TINE FLAKERS (5 SPECIMENS)

Tines were sometimes cut from the racks of deer or elk by transversely sawing through the outer compact layer, then by snapping

the softer interior. Two of these objects were made in this manner. The tine shafts are longitudinally scored by a multitude of closely spaced grooves, and the tips are round and blunt. Three other implements, simply broken from the rack, carry small nicks and striations near and at the tip which resemble those on tines which were experimentally used to flake chert. Lengths range from 65 to 136 mm. (fig. 11, *e*).

SHELL

SCRAPERS (27 SPECIMENS)

The valves of fresh water mollusks were cut and ground to form tools best described as scrapers. There are two forms: (1) The shell was cut from the umbo (or from a complementary position on the ventral side) obliquely toward the anterior end, leaving a sharp to blunt tip; there are seven such specimens (fig. 12, *q*). (2) Other valves were cut on both sides of the anterior end, the resulting tool having a V-shaped working end with a sharp to blunt tip; there are six such implements (fig. 12, *r*). In addition, there are 14 specimens so broken that they cannot be clearly identified as to form. The size of the implement depends on the size of the mollusk chosen as raw material. Species used include *Lampsilis luteola* (Lamarck), *Lasmigona complanata* (Barnes), and *Anodonta grandis* Say (identifications all by Dr. J. P. E. Morrison).

PENDANTS (2 SPECIMENS)

The valve of a small fresh-water mollusk identified by Morrison as *Crenodonta costata* (Rafinesque) is pierced near the umbo by sawing through the shell (fig. 12, *n*). A broken piece of thin, fresh-water mollusk shell, originally oval in outline, was pierced for attachment by a biconical hole (fig. 12, *m*).

RING (1 SPECIMEN)

This ring-shaped item, 42 mm. in diameter, was cut from the shell of a heavy, fresh-water mollusk. The broken ends have been smoothed; the cross section is rectangular (fig. 12, *o*).

THUNDERBIRD EFFIGY (1 SPECIMEN)

The valve of a large, heavy mollusk shell was carved into a form best understood by reference to the illustration (fig. 12, *l*). It was broken, but the piece seems to consist of a stylized bird head in profile and part of the breast and one wing. The outline reconstruction is based on the assumption that it is part of a form like those from the Tony Glas Site (Howard, 1962 a, pl. 6, *8–12*).

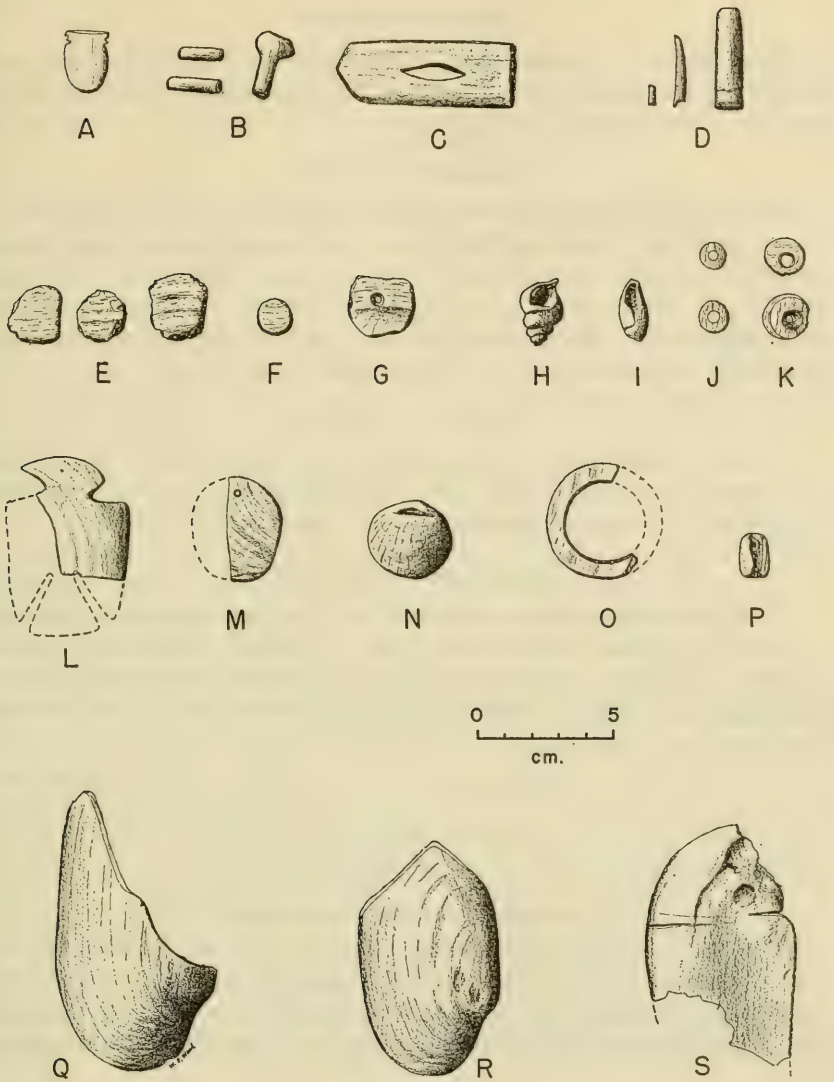


FIGURE 12.—Shell artifacts and miscellaneous bone artifacts. *a–c*, Bone items, recovered by Thad. Hecker in House 5 in 1938–39 and redrawn from his field sketches. *d*, *Dentalium*. *e*, Rough-shaped shell disks. *f*, Shaped shell disk. *g*, Pierced disk. *h*, Pierced fossil shell bead. *i*, Ground *Olivella* shell bead. *j,k*, Shell disk beads. *l*, Shell thunderbird. *m*, Shell disk pendant. *n*, Pierced mollusk shell pendant. *o*, Shell ring. *p*, Tubular shell bead. *q,r*, Mollusk shell scrapers. *s*, Cut mollusk shell.

DENTALIUM (4 PIECES)

These shells of *Dentalium* sp. are of marine origin; they are not local fossil forms (p. 109). Three of them are relatively small pieces, but one is quite large (fig. 12, *d*).

SHELL DISKS (6 SPECIMENS)

Four of these items are rough-shaped disks, cut from the shell of heavy mollusks; they are 17 to 24 mm. in diameter and average 5 mm. thick (fig. 12, *e*). One shaped disk is 13 mm. wide and 2 mm. thick (fig. 12, *f*), and a final specimen is an irregularly shaped disk cut from heavy shell, the center of which is pierced by working on both faces with a tapered drill; it is 24 mm. wide (fig. 12, *g*).

DISK BEADS (8 SPECIMENS)

Thin to chunky disks cut from shell are centrally pierced from both sides with a tapered drill, or with a cylindrical tool leaving a parallel-sided hole. Diameters are 9 to 16 mm. (fig. 12, *j*, *k*).

BARREL BEAD (1 SPECIMEN)

This bead was cut from a massive, unidentified shell, the structure of which resembles marine conch shell. It is 15 mm. long and 10 mm. wide; it was longitudinally pierced by a tapered drill inserted from both ends. There is a conical pit in this perforation, made after the bead was broken (fig. 12, *p*).

CUT MOLLUSK SHELL (1 SPECIMEN)

A fragment of a fresh-water mollusk is cut and may be raw material for the manufacture of some other artifact (fig. 12, *s*).

GASTROPOD BEADS (7 SPECIMENS)

Six fossil *Ambloxis nebrascensis* served as raw material for beads. They are sawed to provide a hole for attachment (fig. 12, *h*). One Pacific coast marine shell (*Olivella biplicata* Sowerby) is also modified for suspension (fig. 12, *i*); these species were identified by Morrison.

MISCELLANEOUS

VEGETAL REMAINS

Remains of this character consist solely of Northern or Eastern Flint corn from Feature 102, behind House 6 (see Appendix 1), and the coil of charred vegetal fibers in House 7 (Feature 198, pl. 5, *c*).

WATTLE-AND-DAUB

An irregular chunk of daub retains impressions of fibrous bundles or twigs 5 mm. in diameter. It is composed of a light buff, highly fired clay from the floor of House 7.

CALCITE CRYSTALS

Irregular calcite crystals, none of them modified, were probably picked up elsewhere and carried to the village area.

PIGMENTS

Two lumps of hematite probably served as the base for red pigment; three pieces of a soft, buff earthy clay would have served for an off-yellow color; and two samples of soft, chalky earth may have been used to provide a white pigment.

POTTERY CLAY AND TEMPER

Two samples of clay from House 9 and from the surface may be unprepared pottery clay, lacking temper. Both lots are fine-grained, dark-gray clay containing no sand. When pulverized and moistened it is quite tenacious, yet is easily modeled, retaining its form well although remaining pliable.

Three pits in House 7 (Features 53, 54, and 72) were filled with pulverized granite, so fine that it resembled coarse sand. This material, perhaps obtained by burning granite pebbles, was likely raw tempering material for pottery making. Such stone might have been taken from fireplaces and crushed.

FAUNAL REMAINS

The following list is thought to include all the identifiable faunal remains from Huff. The mollusks were identified by Dr. J. P. E. Morrison, Division of Mollusks, U.S. National Museum; the birds, by Loye Miller, Department of Zoology, University of California, at Davis; the bison, fish, and reptiles, by Wood; and the remaining species by Dr. J. Arnold Shotwell, Museum of Natural History, University of Oregon.

Mollusks:

Gastropods	Fossil *Ambloxis nebrascensis* (Meek and Hayden).
	Olivella biplicata Sowerby
Scaphopods	*Dentalium* sp.
Pelecypods	Fresh water mollusks:
	Crenodonta costata (Rafinesque)
	Lasmigona complanata (Barnes)
	Lampsilis luteola (Lamarck)
	Anodonta grandis Say

Chordates:		
	Fish	Catfish, probably *Ictalurus*
	Reptiles	Turtle, unidentified
	Birds:	
	Birds of prey	Golden eagle, *Aquila chrysaetos*
		Great horned owl, *Bubo virginianus*(?)
		Marsh hawk, *Circus cyaneus*
		Hawks, *Buteo* sp.
	Wading and swimming birds	Whistling swan, *Cygnus columbianus*
		Whooping crane, *Grus americana*
		Goose, *Branta canadensis*
		Duck, unidentified
	Other	Heath hen, *Tympanuchus cupido*
		Bittern, *Botaurus lentiginosus*
		Crow, *Corvus brachyrhynchos*
		Raven, *Corvus corax*
		Magpie, *Pica pica*
	Mammals:	
	Carnivores	Dog, wolf, or coyote, *Canis* sp.
		Badger, *Taxidea taxus*
		Gray fox, *Urocyon cinereoargenteus*
	Rodents	Jackrabbit, *Lepus* sp.
		Ground squirrel, *Citellus* sp.
		Beaver, *Castor canadensis*
	Artiodactyls	Bison, *Bison bison* (88 individuals)
		Deer, *Odocoileus* sp. / Antelope, *Antilocapra* sp. (6 individuals)
		Elk, *Cervus canadensis* (3 individuals)

A detailed discussion of the bison remains from Huff, as well as those from the Paul Brave and Demery Sites, is included here as Appendix 2 (see also Wood, 1962 a). The avian data appearing above were taken from a tabulation of bird remains from three local sites—Huff, Paul Brave, and Demery (Miller, 1961). It should be noted that in the table appearing on page 126 of Miller's article the 10 bones identified as "Specimens worked into awls" are from the Huff Site; they are incorrectly listed under the Paul Brave Site.

THE HUFF FOCUS

COMMUNITY PATTERN

The Huff Site was built on the first high terrace of the Missouri River, and was originally placed so that it abutted very nearly upon the riverbank. In this respect it did not differ from most of the other semisedentary village sites along the Missouri River in the Dakotas. The really distinguishing feature of the site is the elaborate fortification system which enclosed the village area. A ditch, fortified on its inner edge by a line of outward slanting stakes, within which was a palisade wall and periodic bastions mounted on an earthen embankment, formed a rectangular enclosure, one side of which was

formed by the riverbank. The present area inside the enclosure is 8.5 acres, and contains 103 houses and a large open plaza; when the site was first built it may have contained as many as 10 acres and 115 houses.

The houses were arranged in irregular lanes inside the ditch, with their entrances oriented away from the river. The large, open, depressed area in the village center is probably correctly identified as a plaza, and it is likely that it contained the sacred cedar of the village. Facing directly upon this plaza was an exceptionally large structure, House 2. This house is interpreted as the village ceremonial lodge for two reasons: it is very large, and it is prominently placed with the entrance facing the center of the plaza. None of the other houses is in an analogous position. The presence of broken household implements and food refuse in the floor pits may indicate that it was a domestic dwelling, but a statement by Bowers (1950, p. 115) regarding Mandan ceremonial lodges may explain this fact: "The ceremonial lodge was occupied by a prominent male of the WaxikEna clan who was known as the custodian of the Okipa lodge. His family lived with him in the lodge." Except for its size and location, therefore, there was nothing to identify it as a ceremonial structure.

There were no large refuse middens at the site, and debris was probably deposited over the riverbank and in old storage pits, in and around the houses, which had become stale with age.

This village pattern cannot be exactly duplicated among sites for which published data are readily available, or in the manuscript sources in the State Historical Society of North Dakota files. The closest local site which seems to conform to the fortification system is the Shermer Site (32EM10) across the Missouri River and a few miles downstream. There is a manuscript map of Shermer in the Historical Society collections, prepared by A. B. Stout and E. R. Steinbrueck, dated July 2–4, 1908, which conforms closely to one prepared by George F. Will and Herbert J. Spinden in 1919 (Will, 1924 a, fig. 11). The Will map depicts all of the Shermer houses as circular, while the Stout-Steinbrueck 1908 map includes six long-rectangular houses with their long axes oriented perpendicular to the edge of the river terrace. Further verification of the presence of long-rectangular houses here is contained in Will and Hecker (1944, p. 78), which asserts that the houses are rectangular. Details of house placement and of any village plaza are now obscured by cultivation, but to judge from both maps, the fortification system was roughly rectangular in plan, with regularly spaced bastions. An examination of the pottery and other artifacts from Shermer in the Historical Society collections reveals that they are virtually the

same as those from Huff. Recent fieldwork at Shermer by Sperry (1966) has confirmed most of the observations made above.

The Tony Glas Site (32EM3) also has a clearly rectangular fortification ditch, but it lacks bastions (Howard, 1962 a). The Tony Glas houses are irregularly placed but there is a tendency for them to occur in lanes; dwellings face a village plaza and the southwest, as do those at Huff. The site is closely related to Huff, since it resembles the Paul Brave and Thomas Riggs Sites in artifact content.

There has been much speculation that the Huff fortification system is directly or indirectly derived from such Middle Mississippian sources as Aztalan, in southeastern Wisconsin (Barrett, 1933). Apart from the general outline of the fortification system there are few specific similarities: the Aztalan system encompasses more than twice the area of Huff; the palisade is composed of large, closely spaced posts, while those at Huff are small and spaced about a foot apart; the bastions at Aztalan are square, with the gorge lined solidly with posts, a situation not paralleled at Huff; and there is no fortification ditch at Aztalan as there is at Huff. The palisade at Aztalan was, however, mounted in an earthen embankment; at Huff the palisade was likewise set in earth, thrown up when the ditch was dug around the village. The nonceramic artifacts shared by both sites are of types with wide temporal and spatial distribution that hold little promise of demonstrating direct relationships. There are no distinctive parallels in pottery, although horizontally applied cord impressions on vessel rims occasionally interrupted by cord-impressed triangles (Barrett, 1933, figs. 84–85, 108, 110) are similar in both sites. The Aztalan pottery, however, is cord roughened rather than simple stamped or smoothed. Even considering these differences one suspects some connections between the sites, connections which are discussed later (pp. 136–137).

STRUCTURES

Eleven houses have been excavated at Huff, and the sidewalls of a number of others have been tested. Nine of them were clearly long-rectangular; one was nearly square, with a four-post foundation; and one revealed no clear indication of the floor plan.

The long-rectangular houses were alined in lanes roughly parallel to the riverbank, and in each case the entrance was directed away from the river. The general characteristics of this particular architectural tradition were covered earlier (pp. 31–32, and table 2). A speculative reconstruction of these houses is offered here in figure 13. Drawing on the basic data presented earlier, a sketch was prepared showing one possible method of supporting a roof, given the following

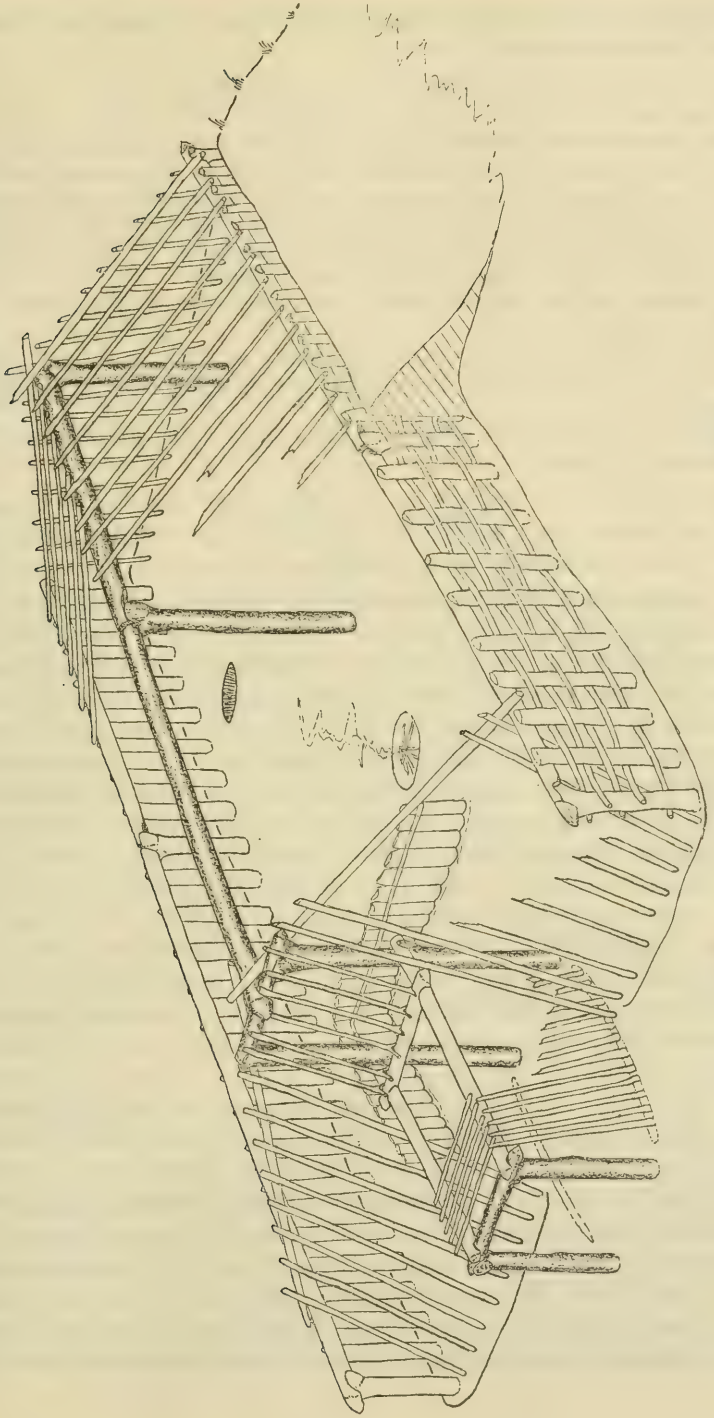


FIGURE 13.—Speculative reconstruction of the Huff long-rectangular houses.

structural details inferred from the posthole pattern and from charred timbers on house floors.

1. A central ridgepole supported by two entrance posts, a large center post, and an end post.
2. A covered entrance passage projecting at right angles from one end of the house, lined with posts set in trenches or by posts resting on the ground level.
3. Vertical sidewalls, built of posts much too thick to have been flexible enough to bend down over the ridgepole. Sidewalls were at least 5 feet high.
4. No substantial postholes in either end of the house, but traces of small timbers indicative of poles resting on the ground surface.
5. The house floor set in a pit, with the entrance projecting into the floor area as an earthen ramp.
6. The primary fireplace between the entrance and the center post, and a firescreen set in a trench which necessitated a turn to the right upon entering the house.
7. A bank of earth along the sides of the house, but not along the ends, covering a wattle-and-daub wall.

The resulting "construction" is, of course, only one of the ways in which the house could have been built; but the superstructure depicted follows so closely upon conditions imposed by the floor plan that it is not likely that the construction departs radically from the original structure. The only detail which does not seem "natural" is the method shown of merging the entrance roof supports with the interior entrance posts; a more plausible technique of so doing is illustrated by Wilson (1934, fig. 40). No effort was made in the drawing to suggest what cover was placed over the superstructure, but quite possibly the roof was either bark or mat covered, or blanketed with willows, then grass, and then sod, after the manner of the historic earth lodges. Perhaps the ends were also covered with mats or skins, since they do not seem to have been banked with earth.

The same architectural pattern occurs in the Paul Brave and the Thomas Riggs Sites, the only significant difference at these sites being that the center post is directly in the house center; at Huff the "center" post is offset toward the back wall. Much the same sort of construction would be imposed at these sites as was observed at Huff.

The firescreens in the Huff houses have yet to be duplicated in other long-rectangular structures, although they are known in historic Hidatsa earth lodges (Wilson, 1934, p. 386) as well as in Mandan lodges (ibid, p. 386 fn.). One other feature deserves special note, the "pottery rest" from the floor of House 7 (Feature 198). This feature consisted of a charred coil of vegetal fibers 0.7 foot in diameter and 0.1 foot thick. Will and Spinden (1906, pp. 157, 181) recovered three or four of these from the Double Ditch Site (32BL8) and Bowers (1950) identifies them as rests to keep round-bottomed pots up-

right on the house floor. The bison skull in House 3 that was stained with red ocher suggests that it was some form of household shrine.

House 12 departs from the common architectural pattern at Huff in many ways. First, it has four center posts, clearly different from the central ridgepole of the long-rectangular houses; second, it is nearly square, as opposed to the 3:2 length-width ratio in the other houses; third, the house ends are closed in with posts; fourth, the entrance passage lacks the large interior entrance posts and any trace of entrance trenches; and fifth, it has a unique feature inside the entrance (Feature 168) not yet reported for any other house type in the Plains. Architecturally, it is deviant, but in terms of artifact content (see table 15) it is indistinguishable from the rest of the houses at Huff. The source for this house type at Huff is undoubtedly from sites downriver along the Missouri, a problem which is discussed at some length in a later section (pp. 134–136, 159).

ARTIFACT COMPLEX

POTTERY

A large inventory of artifacts of many classes was found at Huff, most of which are shared with a great number of village sites of differing cultural affiliation in the Central and Northern Plains. Major distinctions appear in the configuration of the elements or attributes present, rather than in the elements themselves, and this is particularly true in the case of the pottery. Most of the pottery is assigned to four wares and to nine types. The wares are distinguished on the basis of rim form, and the types on the basis of rim modification and decoration. Types and examples that occurred are shown in table 13.

Table 13.—*Majority and minority types at Huff*

Majority types	Percentage	Minority types	Percentage
Riggs Decorated Lip	10.7	Riggs Plain	1.4
		Riggs Filleted	.4
Fort Yates Cord Impressed	23.4	Fort Yates Plain	.1
		Fort Yates Incised	1.5
Le Beau Cord Impressed	11.1		
Stanley Tool Impressed	16.2	Stanley Plain	.7
Unclassified cord impressed	32.6	Unclassified, miscellaneous	.7

This classification differs from that of Howard (1962 b, pp. 29–33) for pottery from the same site. He grouped Huff pottery of all rim forms under "Huff Ware," and defined five component types based on the technique of decorating the rim and lip. His type "Huff Rainbow," for example, includes both of the types here termed "Fort Yates Cord Impressed" and "Le Beau Cord Impressed," as well as a few

examples of Fort Yates Incised. Table 14 illustrates the overlapping of the two classifications; the figures in the table are the number of examples reported by Howard from Huff.

TABLE 14.—*Huff site pottery types*

Types as defined herein	Types as defined by Howard					
	Huff Rainbow	Huff Incised Lip	Huff Punctate	Huff Notched Lip	Huff Plain	Percentage
Riggs Plain					26	8.6
Riggs Decorated Lip		52	12			20.6
Riggs Filleted						
Fort Yates Plain						
Fort Yates Incised	33					10.6
Fort Yates Cord Impressed	106					34.1
Le Beau Cord Impressed						
Stanley Tool Impressed		59	3	19		26.0
Stanley Plain					1	.3

The four wares and nine types recognized at Huff are all apparently indigenous to the site, there being no reason to presume that any of them are trade pieces. The Riggs Ware types and the Fort Yates Ware types are carryovers from the Thomas Riggs Focus. Le Beau S-Rim Ware, however, is a Huff Focus elaboration of the S-shaped rims of the Fort Yates Ware. These and other changes and their significance are discussed in a later part of this study (pp. 161–162). A few of the sherds from Huff, however, are either trade pieces or are outside the range of variation of previously described types.

The Example A rim sherd from Huff is distinctive enough to be classed as a trade sherd. In addition to the incised designs and the finger pinching on the rim, the paste of the sherd itself differs from the rest of the pottery sample. Examinations of the majority of the pottery in the collections of the State Historical Society of North Dakota over a period of years have detected nothing comparable to this rim from sites in North Dakota. Geographically, the nearest parallels are a few rims from the Demery Site, 39CO1 (Woolworth and Wood, 1964, pl. 13, *g*). Example A is not only alien to the village complexes along the Missouri River north of the North and South Dakota boundary, but it is of a variety that is rare even where parallels do occur, principally in central South Dakota. The rim form and design, however, can be closely matched in Redbird Focus Sites as far south as the mouth of the Niobrara River in north-central Nebraska (Wood, 1965 a, fig. 3). The Huff sherd, regarded as a trade item, cannot be traced to a particular source, although the general area of central or northern South Dakota is indicated.

A number of rim sherds which are not classified here seem, on the basis of their paste, to be variants of indigenous pottery or unique

specimens. Example B is a flared rim with three horizontally incised lines near the lip. It is typologically nearest the type Nordvold Horizontal-Incised (Hurt, 1957, pp. 44–45) described from the Swan Creek Site; it also occurs at the Rosa and the Payne Sites (Hurt, 1959; and Wilmeth, 1958). The Huff rim has faint brushing on the neck. Example C, a flared rim with an incised lip and shoulder, is horizontally smoothed over what was either vertical brushing or cord roughening. Example D is a gently recurved, punctated rim with the maximum thickness at the lip. Neither of the two latter pottery examples closely resembles named types.

The patterns incised on the shoulders of Huff pottery are not directly comparable to others yet published from the Middle Missouri area. Their nearest parallels are with the geometric abstract patterns in Thomas Riggs Focus components. They have been discussed in some detail in a separate and earlier paper (Wood, 1962 b), and are briefly considered in a later section of this study (pp. 161–162).

The Huff body sherds are predominantly simple stamped (63.0 percent), with smoothed and decorated sherds less common (21.6 percent and 14.0 percent, respectively). Red-filmed sherds were present but rare (1.4 percent). No clear evidence of cord-roughened body sherds occurs in the excavated sample. During the 1960 field season a single cord-roughened body sherd was taken from the riverbank at a depth of about 1 foot, some 20 or 30 feet north of the northern boundary fence of the park, and well outside the ditch. During the analysis of the pottery a few smoothed sherds were noted which might have been originally cord roughened, then smoothed, but the impressions were too faint for positive identification. Another body treatment lacking in the excavated sample was check stamping; not even a hint of this treatment was observed.

CHIPPED AND GROUND STONE

Most of the projectile points from Huff are small, triangular arrowpoints with straight or concave bases, nearly all of them having two side notches. Two large, lanceolate, side-notched points may be lance tips, as well as two large, triangular side-notched points. Five other points, which are more heavily patinated than the rest of the projectiles, are interpreted as aboriginal "collector's items": these include two Hanna points and three other points of about the same age as Hanna points, or a little later. Howard (1962 b, p. 20, 19, *c*) also recovered the base of a lanceolate point which probably predates the village.

The straight-shafted and expanding base drills, and planoconvex end scrapers are of forms widespread in the Plains. A rare form of end scraper is bifacially flaked, with the appearance of having been made from knife ends or midsections. Plate chalcedony knives,

several classes of broad and narrow knives, choppers, and modified flakes (flake knives and scrapers) were common.

Ground stone includes diorite celts and one unusual, pecked diorite ax, neatly and fully grooved. Arrowshaft smoothers, grooved mauls, and abraders are of common forms. Rather less common are a series of grooved ironstone nodules. Metates were used together with shaped manos and with unshaped hammer manos, most of the shaped manos being pitted on one face. One mano was recovered at Paul Brave (Wood and Woolworth, 1964, p. 34); there were eight from Thomas Riggs (Hurt, 1953, p. 39); and Strong reports them from On-a-Slant Village (1940, p. 364). Pebble hammerstones, a sandstone game piece, scoria beads, scoria and clay pendants, and a stone pipe complete the list of stonework.

BONE AND ANTLER

Scapula hoes, used without modification of the glenoid, and bison horn core-frontal bone scoops are common digging tools. Squash knives are of two forms, rectangular and elongated. Two of the shaft wrenches are incised with anthropomorphic figures, but the cannon bone fleshers, bone tubes, bison humerus abraders, game pieces, pottery modeling tools, chisels, and bone awls are all of familiar forms. Spatulas, polishers, punches, and a bison humerus gouge are rare items. Two very unusual implements, resembling chisels, have bifacially flaked "bits"; flaked bone is not a common trait anywhere in the Plains, and analogous cases are unknown.

Antler tools include an L-shaped scraper haft, similar in outline to those from Tony Glas (Howard, 1962 a, p. 28, pl. 5, *3*); tine flaking tools; cylindrical antler tools; and bracelets. The bracelets are of two forms: broad flat ornaments; and more narrow ones, with oval to subrectangular cross sections. The Huff specimens appear to have been made in the manner described by Steinbrueck (1906). These items are very nearly restricted in their distribution to the Northern Plains, where they seem to occur predominantly in sites of Mandan affiliation or related sites. They occur at Paul Brave (Wood and Woolworth, 1964, pp. 45–46, fig. 11, *a*, *g–i*); Tony Glas (Howard, 1962 a, pl. 4, *7*); Double Ditch (Will and Spinden, 1906, p. 172, pl. 36, *w–z*); and they are in the Historical Society collections at Bismarck from On-a-Slant Village. Baerreis and Dallman (1961, pp. 316–327) report the same forms from sites in the vicinity of Mobridge which they identify as having been made from bone; they should probably be reexamined to see if they might not be antler. Wedel has also found implements of this sort in the Tobias site in central Kansas (1959, pp. 298–299, pl. 34, *a–b*, *e–h*, *j–k*), and they occur sporadically in other sites to the south and east of the Dakotas.

SHELL

Beveled fresh-water mollusks, used as scrapers, are identical to specimens illustrated from Double Ditch (Will and Spinden, 1906, p. 167, fig. 5, *a*). A shell "ring" was recovered at Huff that does not closely resemble any local shell item, although the pendants, a pierced mollusk shell, disks, and disk beads are familiar items in Northern Plains village sites. One carved shell fragment shown in figure 12, *l*, is restored on the assumption that it is part of a form like the thunderbird effigies from the Tony Glas Site (Howard, 1962 a, pl. 6, *8–12*).

Four pieces of *Dentalium* were recovered on house floors in 1960, and Howard (1962 b, p. 24) recovered three other fragments in 1959. *Dentalium* was an important trade item during the historic period and was widely used for embellishment on Plains Indian costumes and artifacts. This species of shell occurs today only in offshore waters along the Pacific Northwest Coast, and this was the source of many of the shells used in the historic trade. Fossil shells do occur in the Oahe Reservoir, however, and Dr. F. D. Holland, North Dakota Geological Survey (in a letter to Dr. Wilson M. Laird, State Geologist of North Dakota, November 1960), states that

> The genus *Dentalium* occurs as *Dentalium gracile* in the Pierre and Fox Hills and as *Dentalium pauperculum* in the Cannonball near Mandan and in the Fox Hills from the Sheyene River and Standing Rock Indian reservations in North and South Dakota. These are both very small species, however, about one-half inch long with the diameter of the shell being about one-eighth of an inch.

It is important that each of the shells from Huff exceeds the dimensions given by Holland for the local fossils. Since they are not local, it is legitimate to infer prehistoric trade, direct or indirect, with the Pacific Northwest Coast. Another marine shell, *Olivella biplicata*, has been identified as also deriving from the Pacific Coast. More recently, seven specimens of *Olivella baetica* Carpenter were recovered from a small butte-top campsite in Grant County, N. Dak. (Cvancara and Kent, 1963). These marine shells were associated with a vessel which compares favorably with examples from Heart River Focus Mandan sites of the historic and protohistoric period, implying that the trade continued well into later periods.

Six local fossil gastropods were recovered at Huff, each of them modified for use as beads. This trait was also noted at Paul Brave (Wood and Woolworth, 1964, pp. 48–50). The Paul Brave gastropods are identified as local fossils, deriving from the Fox Hills, Cannonball, and Tongue River formations (F. D. Holland, letter to W. M. Laird, November 1960). Small parties probably gathered these fossils while they were on hunting or gathering excursions in the vicinity of the villages, along the river bluffs, where these fossil-bearing strata are exposed. (See table 15.)

TABLE 15.—*Artifact inventories: houses and site total* [1]

Type	House											Total from site
	1	2	3	4	6	7	8 [2]	9	10	12	Other	
RIM SHERDS:												
Riggs Plain		1	1	2	1	3	2		1	2		13
Riggs Decorated Lip	4	2	18	19	13	11	18/3	8		10		101
Riggs Filleted			1			2				1		4
Fort Yates Cord Impressed	5	8	49	26	17	23	39/24	8	11	10		220
Fort Yates Incised				2	2	2	2/2					14
Fort Yates Plain			1									1
Le Beau Cord Impressed	4	5	11	15	10	12	24/12	4	4	5		106
Stanley Tool Impressed	3	7	25	13	21	21	20/9	3	12	19		153
Stanley Plain			4	2						1		7
Unassigned strap handles					1	1						2
Example A		1										1
Example B									1			1
Example C			1									1
Example D					2							2
Unclassified cord-impressed	5	22	58	25	49	38	56/24	11	13	16		317
BODY SHERDS:												
Simple-stamped			997	276	184	188	282/152	54	66	113	89	2,381
Smoothed			193	116	60	49	222/46	27	30	54	17	814
Red-filmed			29	4	5	4	4/4			1		51
Decorated			176	32	47	36	108/37	3	34	24	36	533
Ceramic disks						1	1					2
CHIPPED STONE:												
Projectile points:												
Class 1			5	4	6	1			3	1	2	22
Class 2			6		3	2	2/1	1			2	17
Class 3			3	2	2		2/1	1	1	4	2	18
Class 4			2	1	1	1					2	7
Class 5						1					1	2
Class 6			1		1							2
Class 7				1	1		2		1			5
Straight-shafted drills				1	1	1	1		1			5
Expanding base drills			1	1		1				1		4
Planoconvex end scrapers			28	8	19	21	21/9	5	3	5	17	136
Bifacially flaked end scrapers			6	1	4		9/2	2	2		3	29
Plate chalcedony knives			1			1						2
Broad knives:												
Oval			2	1		1	2				2	8
Leaf-shaped			5	1	5	2	4			1	3	21
Triangular, straight base			5	1	1			1	1		1	10
Narrow knives:												
Oval			3			1	2	1	1			9
Leaf-shaped			2	2	1	2	0/2			1	3	13
Choppers			9	8	4	7	9/2	2	1		4	46
GROUND STONE:												
Diorite celts			7	9	2	5	9	3		1	4	40
Diorite ax							1					1
Arrowshaft smoothers			2	1	1	1						5
Abraders			7	9	3	6	8/1		1	1	5	41
Grooved ironstone nodules			1	3	2	9					1	16
Anvil											1	1
Metates			4	7		1	8		3			23
Shaped manos			2	2			1			1	2	8
Hammer manos			3	4	2	2	5	1	1		1	19
Battered sphere hammers			1	8		2	2		1			14
Pebble hammerstones			11	3	1		7/1				2	25
Game piece							1					1
Beads				3		1						4
Pendants			1				1					2
Pipe											1*	1
BONE:												
Scapula hoes			77	15	7	10	7/18	5	19		22	180
Horn core-frontal bone scoops			9	2		1	1		2		4	19
Scapula knives			5	1	2	1			2		5	16
Shaft wrenches			1	1	1		2/1				2	8
Cannon bone fleshers								1		1		2
Bird bone tubes			1			1						2
Bison humerus abraders			1				1		2		1	5
Game pieces			1	6	2	1	4	1	2		5	22

See footnotes at end of table.

TABLE 15.—*Artifact inventories: houses and site total* [1]—Continued

Type	House											Total from site
	1	2	3	4	6	7	8 [2]	9	10	12	Other	
BONE—Continued												
Long bone awls:												
Head intact						1	0/1					2
Head split			3	1	3	3	3	1	1		4	19
Head reduced			9	2	3	4	4/4	4		1	8	39
Head removed			5	1		1	4/1					12
Long bone splinter awls			1							1		2
Scapula splinter awl			1									1
Mammal rib awls					1	1	0/2				2	6
Bird long bone awls:												
Head intact			1			3	1/3		1	1		10
Head removed						1						1
Splinter					2							2
Needle (?)										1		1
Pottery modeling tools			7	4	3	4	5/2	1	2	3	10	41
Bifacially flaked bone tools				1							1	2
Chisels			1	2	1	1	1		1		2	9
Spatulas			1				0/1					2
Polishers			4		1		1		1		2	9
Punches			3			2					1	6
Bison humerus gouge					1							1
ANTLER:												
L-shaped scraper haft			1									1
Bracelets			5			4	3			1		13
Barrel-shaped tools			1	1	1	1	1			1		6
Tine flakers			2			1	1			1		5
SHELL:												
Scrapers			6	1	3	9	3/1		1		3	27
Pendants			1	1								2
Ring			1									1
Thunderbird effigy					1							1
Dentalium				1		2	1					4
Disks			2	1		1	1	1				6
Disk beads			2	1	1		2/1				1	8
Barrel bead						1						1
Gastropod beads			2		1	1		1		1	1	7
Cut mollusk shell											1	1
MISCELLANEOUS:												
Wattle-and-daub						×						
Calcite crystals			×				×				×	
Pigments			×			×	×					
Corn					×							

[1] Includes material recovered in 1960 only, with exceptions from Thad. Hecker's work in 1938–39 marked with an asterisk (*).

[2] In this column, the figure on left of shilling mark is the number of artifacts from the house floor; on right, number from pits predating the house.

POPULATION CHARACTERISTICS

It is perhaps inappropriate to discuss, under a heading this broad, the three human burials from Huff, even though these burials have been analyzed in some detail by specialists, and assessed in terms of putative Mandan skeletal material (Bass and Birkby, 1962). The comments following have been abstracted from the Bass and Birkby study of the Huff material.

Each of the Huff burials is that of an adult female. Their mean estimated height is fairly tall, ranging from 5 feet 2¼ inches to 5 feet 9⅝ inches (158.77 to 176.99 cm.). Burial 3 was the only inhumation with a skull, the cephalic index of which was 67.51 (dolichocephalic). The mean cranial index of 73.9 for 12 putative Mandan males and of 75.69 for 21 females (including the Huff female

of 67.51) compares favorably with the Mandan skulls reported by Strong (1940, p. 363). Strong's three males had a mean of 73.4 and his four females a mean of 75.5, supporting his assertion that the Mandan are strongly dolichocephalic.

Probably the most significant post-cranial anomaly was the presence of 25 presacral vertebrae in burials 1 and 3—7 cervicals, 13 thoracic, and 5 lumbar—although the incidence of 25 presacral vertebrae has been noted for other non-North American groups in percentages ranging from 3.9 to 7.2 percent. This anomaly serves to—

> point up the importance of further work at the Huff site, for this may be a morphological indication of an inbreeding pre-historic Plains population. It is true that no more than a supposition can be made from such limited skeletal material, but the fact cannot be ignored that the *only* 2 primary burials that were excavated had such similar and unusual anomalies. [Bass and Birkby, 1962, p. 166.]

Since Mandan of the same clan usually lived fairly near one another in the village, and since the houses in which the burials were recovered (Houses 7 and 12) were not far distant, it is perhaps possible that both individuals belonged to the same clan. Since anomalies of this type commonly occur in families, we may be dealing here with a situation which was not reflected in the village as a whole, although only a larger sample can resolve this most interesting problem.

TAXONOMY

The archeological work at Huff in 1960, in conjunction with prior excavations at the site, has revealed a rather complete picture of this noted village. Huff has been variously identified, in a taxonomic sense, as the "Huff Focus" and as "Middle Mandan." The relative merits of both terms deserve consideration.

Alfred W. Bowers, in his doctoral dissertation (MS. b, 1948), named the Huff Focus, using Huff as the type site. Among his determinants were long-rectangular houses enclosed in a rectangular fortification with bastions; the ceramic attributes of the focus were contrasted with the pottery of his Heart River Focus. The latter focus includes such protohistoric and historic Mandan villages near the mouth of the Heart River as Double Ditch and On-a-Slant Village. A number of local sites resemble Huff, sharing its general fortification pattern and long-rectangular houses, and contain pottery typologically the same as that at Huff. Notable among these sites is Shermer, a few miles down the Missouri River and on the opposing bank. There are two other sites even nearer Huff that, on the basis of pottery in the collections of the North Dakota State Historical Society, resemble

the Huff ceramics: these are the Jennie Graner and the Huff Station Sites (32MO12 and 32MO13), just north and east of the hamlet of Huff (see map 2). The latter two sites, unfortunately, are known only from surface collections of pottery, and nothing is known of other artifact types. The Shermer, Jennie Graner, and Huff Station Sites are tentatively assigned to the Huff Focus, as defined in table 15 and in the preceding text, until excavation clearly reveals their status. There is little doubt but that a large number of other sites will ultimately be shown to be similar to the type site.

In the Will and Hecker formulation, the Huff Site and related villages are termed "Middle Mandan," Huff being regarded as a type site for this "complex" or "horizon" (Will and Hecker, 1944). These writers proceeded on the assumption that there was a cultural continuum from such sites as Paul Brave, through Huff, to the historic Mandan. This assumption has been amply demonstrated by recent fieldwork, and at the time this study was first written I conceived of a development from the Thomas Riggs Focus through the Huff and Heart River Foci to the historic Mandan. This view, for example, was contained in a partial summary of the first draft of this study (Wood, 1965 b).

In the latest synthesis and reclassification of the village complexes in the Middle Missouri area, Lehmer and Caldwell (1966) advocate a revised and refined taxonomy in which Huff is ascribed to the "Terminal Middle Missouri horizon." This horizon largely corresponds to, although it is not necessarily equivalent to, Will and Hecker's "Middle Mandan." The recent publication of the Fire Heart Creek Site (Lehmer, 1966), with the new data it contains in interpretative section (presented in terms of the Lehmer and Caldwell reclassification) reveals that earlier simplistic schemes will share the fate of other syntheses based on too few data—revision and elaboration.

Lehmer and Caldwell's reclassification is based on the conceptual scheme of Willey and Phillips (1962), with such modifications of this scheme as they felt necessary in interpreting the data in the Northern Plains. In this reclassification, they recognized the three cultural traditions of the Plains village cultures earlier postulated by Lehmer (1954 a; 1954 b): the Central Plains Tradition, the Middle Missouri Tradition, and the Coalescent Tradition. Each of these cultural traditions has, as its core, a number of technological traditions which provided the means for its recognition. The Central Plains Tradition includes the Upper Republican and Nebraska complexes; the Middle Missouri Tradition consists of the early village cultures in the Missouri River trench in the Dakotas; and the Coalescent Tradition includes those cultures resulting from a late fusion of the Central

Plains and Middle Missouri traditions (Lehmer and Caldwell, 1966, p. 513).

The Middle Missouri and Coalescent traditions are crosscut by three horizons, as follows (Lehmer and Caldwell, 1966, p. 513):

Horizon	Phases (foci)	Estimated dates
	Middle Missouri Tradition	
Initial	Monroe, Anderson, Grand Detour, Over	A.D. 800–1300
Extended	Thomas Riggs, Fort Yates	1100–1550
Terminal	Huff	1550–1700
	Coalescent Tradition	
Initial	Anoka, Campbell Creek	1450–1550
Extended	La Roche	1550–1700
Post-contact	Talking Crow, Stanley Snake Butte, Le Beau, Late Heart River	1700–

Some of these horizons occupied different segments, or districts, of the Missouri River valley, at different times in their histories (see Lehmer and Caldwell, 1966, fig. 2; Lehmer, 1966, fig. 7).

Since Lehmer and Caldwell's (1966) and Lehmer's (1966) studies appeared while this study was in press, it was not possible to fully integrate the present synthesis with that of these individuals. The present comments, therefore, should be kept in mind in following the discussions in the sections to follow.

CHRONOLOGY

In 1946, George F. Will published the results of his tree-ring work in North and South Dakota. This work was based on a master chart prepared from a burr oak cut in 1940 some 6 miles northwest of Bismarck, N. Dak. The master stump was cut in a coulee along the Missouri River not far from the Double Ditch Site. Working back from this master oak, Will felt that he successfully dated several village sites along the Missouri River, including Huff, on the basis of 11 timbers recovered by Thad. Hecker's work there in 1938–39. The cutting dates and other published data (Will, 1946, pp. 15–16) are:

A.D.	*Sample No.*
1543	2.
1542	7.
1526	6 (oak).
1524	3.
1518	5 (oak, 6-inch diameter).
1515	4.
1514	11.
1513	9 (oak, 4½-inch diameter).
1509	1.
1505	8 (oak, 6-inch diameter).
1485	10 (oak, 4½-inch diameter).

The range in cutting dates is from 1485 to 1543, spanning 58 years. Even with error in the Will calculations, a median date of A.D. 1500 seems consonant with current impressions of the local archeological sequence. Tree-ring analyses of the wood obtained by the recent excavations at Huff, including a reanalysis of the older timbers studied by Will, should be made.

The results of five Carbon-14 age determinations are now on hand from the Huff Site, provided by the Radiocarbon Dating Section, Smithsonian Radiation Biology Laboratory.

Sample No.	Material dated	Provenience	Calculated age
SI–178	charcoal	Primary fireplace in House 3	A.D. 1640 ± 90
SI–179	wood	Post from northeast wall of House 3	A.D. 1480 ± 90
SI–180	charcoal	Floor level of House 8	A.D. 1770 ± 120
SI–182	charcoal	Feature 167, House 12	A.D. 1180 ± 140
SI–183	wood	Post from wall line of House 12	Modern (younger than A.D. 1810)

Two of these dates are rejected. SI–183 is much too late, for the site is prehistoric, and SI–182 is impossibly early. The remaining three dates are within an expectable range of variation. SI–179 is consistent with the range of A.D. 1485–1543 obtained by Will in his analysis of the timbers from the 1938–39 excavations, and SI–178 is consistent with the presence of La Roche Focus trade pottery at the site. SI–180 is probably too recent, but the fact that it is late is, at least, consistent with the superposition of House 8 over preexisting pits filled with village refuse from the same occupation as that represented by the rest of the site.

Thus we still have no firm or convincing dates for the Huff Site. Will's analysis of the Huff timbers must be viewed with skepticism in the light of the many complications attending tree-ring dating of which he was unaware. On the other hand, his results are presently in phase with what we know of Northern Plains prehistory, and there seems little doubt but that part of the period during which Huff was actually occupied is included in the A.D. 1485 to 1543 range obtained from his analysis.

The five radiocarbon dates do not appreciably assist in dating the site. Ignoring samples SI–182 and SI–183 as impossibly early and late, the three remaining dates span three centuries—there is a span of two centuries from House 3 alone. I am unwilling to suggest which, if any, of them is "correct," although the A.D. 1770 ± 120 date seems

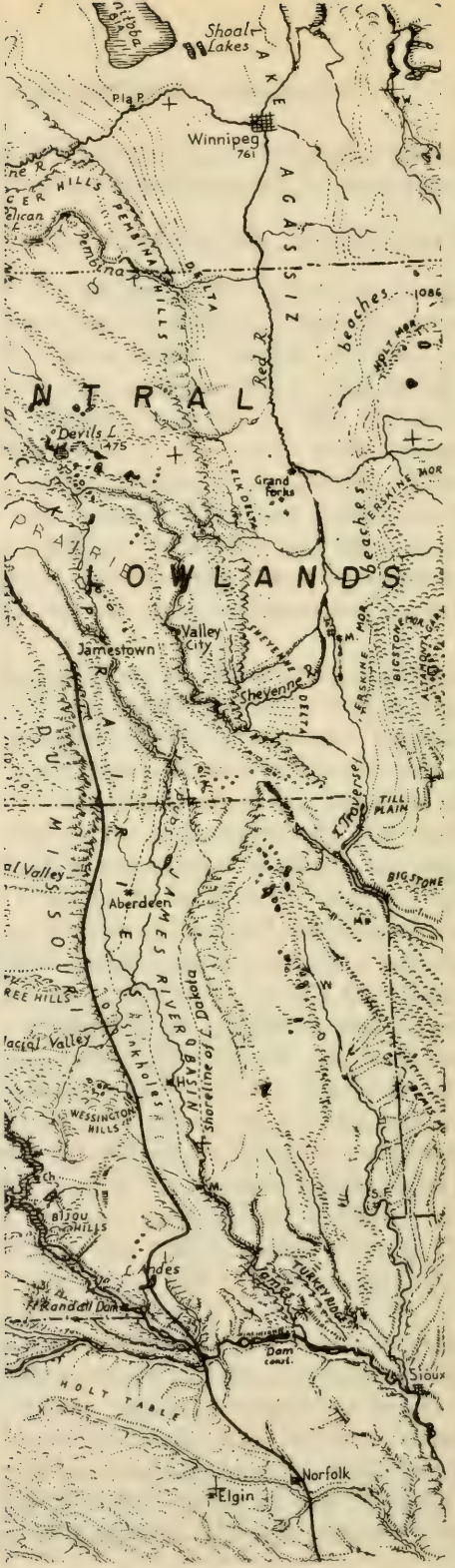
to be rather too late. Until more data are available, therefore, it is still my impression that the site dates between A.D. 1400–1600.

SYNTHESIS: THE MANDAN ARCHEOLOGICAL SEQUENCE

This section presents the archeological record of Mandan prehistory, based both on the extant archeological and the ethnographic evidence. The narrative begins about the 8th century or earlier, deriving 13th-century Mandan culture from preexisting culture complexes. The earliest historical records of the region in which the Mandan lived, dating back to the early 18th century, often speak of tribal fusions, intermarriage, and schisms. There is no reason to suspect that such intermingling and separation of genes and ideas have not been going on for a very long time and that the 16th-century predecessors of the Mandan differed in many respects from the tribe as described by the early explorers and by subsequent ethnographic fieldwork.

It is manifest that the sequence of prehistoric complexes in the Dakotas discussed here can be attributed only to the Mandan or to culturally cognate groups. These prehistoric complexes are certainly not Mandan as that tribe is known to history, but the proposition will be defended that they are in the Mandan tradition, having contributed directly to the cultural stream that ended with the historic Mandan. Such a proposition is clearly an assumption, but at the present time it seems to be a useful working hypothesis that underlies the thinking of most of the local students of prehistory, even in carefully controlled discussions of taxonomy and sequence. Denials of this proposition rest principally on the fact that there is not yet an archeological record sufficient to demonstrate it, even when all other lines of evidence seemingly support the hypothesis. As the prehistoric manifestations which provide the bulk of culture history are slowly tied to historic tribes, we become less interested in describing the changes and differences between prehistoric complexes than we are with the story of the admittedly inferential histories of tribal groups. While it seems permissible, however, to discuss "Mandan" history as early as the 13th century, prior to that time the utility of tribal reference is lost and their fortunes are best discussed under taxonomic names.

The following data relate primarily to sites and complexes in North and South Dakota, and their relations wlth manifestations in adjoining areas. The Dakotas have been variously referred to as the "Northern Plains" and as the "Upper Missouri" area, but more recently this region has come to be known to archeologists as the "Middle Missouri" area (Lehmer, 1954 a, map 5). References to the "Central Plains" are to the present State of Nebraska and immediately contiguous



a (copyright 1957 by E. Raisz).

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areas, while the "Eastern Woodlands" will refer to the regions east of the Middle Missouri and Central Plains areas, and encompass the area sometimes known as the "Upper Mississippi Valley" (map 18).

MANDAN PRECEDENTS

NOMADIC HUNTERS

The earliest settlers in the Middle Missouri area appear to postdate the retreat of the last glaciation. These groups were dependent upon big game hunting, with food gathering inferred to have been of secondary importance. Suspected of having consisted of small bands of free-wandering hunters, they hunted elephants and, later, now extinct forms of giant bison. The size of their projectile points hints that the atlatl was the primary weapon. This general pattern of life endured almost to the beginning of the Christian era, when they were replaced or absorbed by a Woodland population with a more complex material culture and a broader economic base, presumed to have moved in from the east or northeast.

In the Central Plains these Woodland people lived in the fertile river valleys and, although there were presumably large herds of bison roaming the adjacent plains, these groups were essentially small game hunters, rarely hunting the bison and even more rarely dependent on horticultural produce (Kivett, 1952, pp. 57, 67–68). But these people were more settled than the earlier big game hunters, judging from their possession of pottery and from occasional evidence of dwellings and horticulture. Some of the Woodland sites in the Middle Missouri area differ from this general pattern in the presence of scapula digging tools of a type used later in horticulture, and in the presence of bison bones in their campsites and cemeteries, both of which suggest a better adaptation to the Plains environment than the otherwise similar groups living in the Central Plains. Burial mounds attributed to these Woodland hunters are common in the eastern Dakotas, and they are present in some number along the Missouri River through most of its course into western North Dakota. There are fewer known campsites, as they were ordinarily in river bottoms and are less easily detected than the upland burial mounds.

Two components of the Woodland Loseke Focus, in southeastern South Dakota, were in now-exposed areas in river valleys adjacent to river bottoms. At the Scalp and Ellis Creek components, 39GR1 and 39GR2, hints of temporary shelters took the form of small, basin-shaped depressions. Among artifacts of particular interest are bison scapula digging tools, a polished celt, a grooved maul, an atlatl weight, and globular, cord-roughened pottery tempered with quartz particles and decorated with cord-impressed and incised rims. Bison, deer, and an occasional elk were the animals hunted. There

MAP 18.—Landforms of North and South Dakota (copyright 1957 by E. Raisz).

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were a few atypical rim sherds which the excavator regarded as related to Central Plains varieties of the Upper Republican and Nebraska Aspects, and to Middle Missouri types of the Over Focus, suggestive of partial contemporaneity with these semisedentary village populations. There is continuity in many artifacts between the Loseke Focus and later sedentary village foci in the Dakotas, but the ceramics and details of settlement are sufficient to distinguish the two groups (Hurt, 1952, pp. 28–32). Another campsite in a now-open river bottom is reported farther north, along the Missouri River a short distance above the North and South Dakota boundary. This camp, the Porcupine Component (32SI6), yielded cord-roughened pottery tempered with crushed granite, and decorated with interior bosses and incised lips. This pottery, together with a grooved maul and a few scapula digging tool fragments, suggests general parallels with the Loseke Focus farther south, and may date from the same general time period. It is relevant to note that the partial remains of at least five bison were in the limited excavations, but there were only two deer (Scheans, MS., pp. 76–81, and appendix).

The Boundary Mound Site (32SI1), straddling the North and South Dakota boundary on the Missouri River a few miles south of the Porcupine Component, consists of four dome-shaped tumuli covering log-covered tombs with secondary scattered and bundle burials. The projectile points from this site closely resemble those from the Porcupine Component, but more exotic items include stone pendants, modified bear teeth, and atlatl spurs. Bison skulls were placed around the burial pit before the mound was erected (Wood, 1960). One speculative interpretation of this feature is that bison were economically important and that they possessed certain ceremonial significance. Similar mounds occur in the Bald Hill area in eastern North Dakota (Hewes, 1949), revealing that this mound group is part of a widespread Woodland burial mound complex.

A particularly interesting burial mound complex from central South Dakota provides data on a somewhat aberrant complex. The Truman Mound Site (39BF224), consisting of six dome-shaped burial mounds, contained both primary flexed burials and secondary scattered or bundle interments both in pits and on the mound floor. Grave goods included large undecorated conoidal pottery vessels tempered with quartz particles and finished with oblique impressions from a grooved paddle. Other burial furniture included triangular projectile points with corner notches or side notches, end scrapers, knives, grinding stones, and bone beads; work in shell included spoons, disk and tubular beads, and pendants. The excavator estimated its age, based largely on the pottery surface treatment, between A.D. 800 and 1200 (Neuman, 1960, pp. 78–92).

Many other Woodland sites and burial mounds are known, but the data introduced suggest that these hunters, depending upon the bison to an extent unknown in the Central Plains, were widespread in the Dakotas over an indefinite period, but likely persisting until the advent of the semisedentary village groups in both the Central Plains and the Middle Missouri areas. The members of these complexes made conoidal pottery vessels, and hunted with the atlatl and almost certainly with the bow and arrow. Many, if not most of them, constructed artificial mounds over their cemeteries. The priority of cord-roughened pottery among these people is suggested on the basis of comparative material from the better-known Central Plains, followed by vessels modeled by using grooved paddles. This sequence of pottery body treatment will be seen to be repeated among their successors, the semisedentary, horticultural village populations of the Central Plains and Middle Missouri areas.

SEMISEDENTARY HORTICULTURALISTS

About the 8th century A.D., or a little earlier, a large population of settled village people occupied the Missouri River valley and the banks of its major northerly affluents over most of southeastern South Dakota. Their villages, and those of all succeeding sedentary peoples, were built on high terraces above flood levels, and near large streams. Recent Carbon-14 dates suggest that these villages were occupied from A.D. 700 to 1200. The Monroe, Over, and Anderson Foci have been described to include sites of these early villagers (Meleen, 1938; Over and Meleen, 1941; Hurt, 1951; and Lehmer, 1954). These foci may be briefly described as villages of long-rectangular houses often fortified by dry moats and palisades, with the people relying on horticulture but with heavy emphasis on the hunting of bison, deer, and lesser game. The internal consistency of the components of the Monroe, Over, and Anderson Foci is such that Hurt (1953, p. 47) collectively designated them the Chamberlain Aspect. In Lehmer and Caldwell's (1966) recent synthesis of the semisedentary village complexes in the Middle Missouri area, this aspect and related complexes are referred to as the "Initial Middle Missouri Horizon."

The origin of the Chamberlain Aspect, relevant ot the problem of the Mandan as it may be, is outside the scope of this study. Hurt (1953, pp. 57–58) and Spaulding (1956, pp. 96–99) both have expressed the opinion, bolstered by the few data now available, that sites of this aspect are related to, and probably derived from, adjoining and presumably earlier complexes of both Woodland and Middle Mississippian affiliation in northwestern Iowa, southwestern Minnesota, and southeastern South Dakota. Sites of the Chamberlain Aspect have, for

example, both Great Oasis and Mill Creek vessel shapes and the S-shaped, cord-impressed rim of Cambria. Spaulding (1956, p. 98) has underscored the strength of Middle Mississippian influence at one of the Over Focus Sites (Twelve Mile Creek) in his statement that a sherd from the surface of the site "is an unqualified example of the Ramey Incised type [Griffin, 1949, p. 51, pl. 1] which might well have been made at Cahokia or Aztalan." He continues with the thesis that the Over Focus was likely extant during the occupation of Aztalan, when similar Middle Mississippian elements were reaching the Nebraska Aspect. It seems clear that the antecedents for the Chamberlain Aspect, or at least the more influential neighbors of the complex, are to be found both to the northeast and southeast.

The village sites of the Chamberlain Aspect may be fortified or open. Villages, when they are fortified, were most often built on terrace spurs and defended by a short, straight ditch cut across the neck of the spur isolating the village on the terrace. The Mitchell Site (Meleen, 1938) and the Pretty Head Site (39LM232, W. W. Caldwell, personal communication) are exceptions to this generalization. The twin ditches at the Mitchell Site swing in a wide arc around the village, protecting it on the sides facing the adjoining level prairie, and the Pretty Head Site is protected by a rectangular ditch.

The houses in these villages are uniformly long-rectangular dwellings set in shallow pits. The houses of the earlier villages (Monroe, Mitchell, and Twelve Mile Creek Sites) have posts on each of the four walls; later, they occur only along the two long walls, as at Brandon and Swanson. Other house details are much the same: a covered passageway to the southwest or southeast, one or two rows of center posts, and one or two fireplaces in the midline of the house. A consistent feature is the fact that the front end of the house is narrower than the back.

Ceramics strongly suggest that the Chamberlain Aspect was a composite group, if not a participant in a broad exchange of ideas with groups in Minnesota, Wisconsin, and Iowa. Whatever the derivation, the ceramics of the Chamberlain Aspect had stabilized into a reasonably predictable pattern: globular vessels with rounded or angular shoulders with flared or S-shaped rims; bodies shaped by a cord-wrapped paddle but subsequently smoothed to various degrees; shoulder areas decorated with broad-trailed lines, rims with incisions, punctates, and cord-impressed lines; and preferred appendages were opposed, paired loop handles. Specific attributes to which reference is often made include rim embellishment and two distinctive types of shoulder design, patterns which consist of (1) a solid field of horizontally incised lines, and (2) rectilinear and cur-

vilinear geometric abstract patterns, with some use of concentric circles (see fig. 15, p. 126).

The nonceramic inventories are essentially the same as those found in virtually all contemporary and subsequent village complexes. The partial list following (modified from Bowers, MS. b) is an effort to present a basic inventory which may be expected in most of the Middle Missouri area sites. Artifacts of known or suspected diagnostic value have been excluded from this list and will be introduced in subsequent sections of this unit.

Pottery:
- Grit tempered
- Mass modeled, shaped by paddle and anvil
- Globular, with rounded or angular shoulders
- Flared and recurved (S-shaped or collared) rim forms
- Incised and cord-impressed rim designs

Chipped stone:
- Triangular side-notched or unnotched arrowpoints
- Triangular and leaf-shaped broad knives
- Elongated, narrow two-edged knives
- Drills
- Planoconvex end scrapers

Ground stone:
- Grooved mauls
- Hammerstones
- Grooved pumice or sandstone abraders
- Arrowshaft smoothers
- Elbow pipes
- Diorite celts

Bone:
- Scapula hoes
- Bison horn core-frontal bone scoops
- Arrowshaft wrenches
- Scapula knives
- Serrated metapodial fleshers
- Pottery modeling tools (or quill flatteners)
- Split metapodial awls

Shell and antler:
- Shell disk beads and disks
- Broad antler bracelets

Subsistence was based on hunting and on horticulture. The relative emphasis on either source of food is unknown, but the presence and number of animal bone and vegetal produce strongly suggest a basic economy much the same as that of the historic Mandan and other historic horticultural tribes. Fishing, the collection of mollusks, and the gathering of wild fruits and vegetables are presumed to have been auxiliary to the meat and garden produce.

The internal relations of this complex have yet to be analyzed in any detail. Carbon-14 dates are, however, available for a number

of the sites. A date for the Breeden (Monroe Focus) Site is A.D. 719± 200; the Swanson and Crow Creek Sites (Over Focus) are dated A.D. 858± 200 and 1058± 200, respectively; the Anderson Focus at the Dodd Site is dated A.D. 1158± 200. (These dates, respectively samples M–608, M–839, M–836, and M–843, were obtained by the Missouri Basin Chronology Program, Missouri Basin Project, Smithsonian Institution, through Robert L. Stephenson, chief.) These dates provide the following sequence: Monroe, Over, and Anderson, a sequence which was earlier inferred from stratigraphy and ceramic seriation.

Of these three foci, the Over Focus is perhaps the best known to date. It will be recalled from the preceding section (p. 118) that Hurt noted a continuity in many of the artifact types from the Loseke Focus into the Over Focus, but that ceramics and village plan were profoundly changed. Because of the limited data on Woodland sites in the Dakotas, there is little comprehension of the contributions of these people to the later sedentary horizons. Evidence is accumulating that may be interpreted as contact between these hunters and the horticulturalists—apparent cross-finds of pottery sherds, and the mutual presence of scapula hoes and grooved mauls—but it is rather likely that such contacts were not always mutually agreeable. The fortifications built by the village people represent a great expenditure of time and energy, and it is not likely they were carried out without ample justification. If our assumptions are correct, the Woodland people were hunters, with limited horticulture, necessitating nomadic and perhaps transient populations. Some groups may have attained respectable strength, judging from the size of their mound groups. Although internecine warfare between village groups may also be advanced as an explanation for the elaborate defensive fortifications of the villages, it is not impossible that these pedestrian nomads were also responsible for some of the defensive measures undertaken by the village people.

THOMAS RIGGS FOCUS: DERIVATION [4]

The earliest village sites which may be regarded as culturally cognate with the Mandan are along the Missouri River in North and

[4] Since this section was written, a number of comments on the discussion offered here seem necessary. First, the Thomas Riggs Focus is ascribed to the Extended Middle Missouri horizon by Lehmer and Caldwell (1966, p. 513). Second, Lehmer (1966, pp. 58–60) has advanced convincing arguments that the northern Extended Middle Missouri sites should be assigned to different taxonomic units, rather than including them all under the Thomas Riggs Focus, as I do here. Thus, he assigns the recently excavated Fire Heart Creek Site (32SI2) and the Paul Brave Site (32SI4) to a new unit, the Fort Yates Phase (Willey and Phillips, 1962, p. 22). The Tony Glas Site (32EM13) is unassigned, appearing to be transitional between the Extended and Terminal Middle Missouri sites.

Also, the Thomas Riggs Site itself was shown, by 1965 fieldwork of the Smithsonian Institution River Basin Project, to be fortified. Figure 14 shows the ditch at this site as it is presently known. There is also an interior palisade line there (Richard B. Johnston, personal communication).

South Dakota between the mouth of the White River in south-central South Dakota and the mouth of the Little Missouri River in western North Dakota (see map 20, p. 130). These sites are those classified by Will and Hecker (1944) as "Archaic Mandan" and by Bowers (MS. b) as the "Cannonball Focus." These two terms are synonymous with the more recently defined "Thomas Riggs Focus" (Hurt, 1953), which provided the first systematic definition of the complex encompassed by the older terms.

The Thomas Riggs Focus now consists of four excavated and reported "pure" components for which there seem adequate data: the type site, Thomas Riggs, 39HU1 (Meleen, 1949; Hurt, 1953); Paul Brave, 32SI4 (Wood and Woolworth, 1964); Grandmother's Lodge, 32ME59 (Woolworth, 1956); and Tony Glas, 32EM3 (Howard, 1962 a). Will and Hecker (1944, pp. 118–121) list 48 "Archaic Mandan" sites, predominantly in North Dakota, many of which Bowers (MS. b) subsumes under his "Cannonball Focus." A number of the sites in North Dakota here presumed to be components of the Thomas Riggs Focus have been variously estimated to date about A.D. 1250–1300 (Howard, 1962 a), A.D. 1350–1450 (Hewes, 1949, p. 23), A.D. 1200–1300 (Will, 1946, p. 17), and A.D. 1300–1400 (Wood and Woolworth, 1964, p. 63). There is an early tree-ring date for the type site (Will, 1948, p. 69) of A.D. 1478–1515. A Carbon-14 date of 1228 ± 200 is now available for the Thomas Riggs Site (sample M–838, determination by the Radiocarbon Laboratory, University of Michigan, for the Missouri Basin Chronology Program). This date considerably predates the tree-ring dates obtained by Will, but substantive tree-ring work now in progress seems to indicate that the Will dates are in fact correct and the Carbon-14 date is far too early. The final outcome of the dating of the Thomas Riggs Focus is a matter of no little interest, for components of the focus have been postulated as the antecedents for the Huff Focus from the time of Will and Hecker's 1944 formulation to the present study. If Will's dates for Thomas Riggs are correct, it implies that Huff and Thomas Riggs were approximately contemporaneous, and deprives Huff of what otherwise is thought to be its antecedent. Warren W. Caldwell (personal communication) informs me that tree-ring work recently carried out by the River Basin Project supports, in general, the later dating. However, sites comparable to Thomas Riggs do seem to be in the southern part of the distribution of the focus. Until the temporal position of the Thomas Riggs Focus is clarified, interpretations of the data are necessary. For the purposes of the present study, the dates A.D. 1100 to 1400 are proposed.

Sites of this focus consist of generally small, open or fortified villages of 14 to 45 houses occupying from 4.0 to 17.3 acres. In the north, only the transitional Tony Glas site is fortified by an enclosing ditch, rectangular in plan, although the possibility exists that other nearby open sites were fortified by techniques leaving no conspicuous surface indications. The sprawling nature of these northern villages does not, however, suggest that defense was as important as it was farther south, where the Thomas Riggs and other related sites are often fortified. There is no rigorous arrangement of houses in the northern villages, although there is a tendency for them to be alined in irregular rows with the entrances facing the southwest. The crescentic arrangement of houses at the fortified Thomas Riggs Site suggests that they faced a central plaza, and at the fortified Tony Glas Site there was a central, open village plaza (see fig. 14).

The houses are uniformly long-rectangular dwellings built over shallow, trapezoidal pits, with a covered passageway and wall posts set along the long walls only. In these and other details they closely correspond to the open-ended houses of the Chamberlain Aspect.

Pottery attributes are uniform in each of the sites. Vessels were made by lump modeling and shaped with a grooved paddle and subsequently smoothed, with only rare cord-roughened sherds. Vessels are globular, with rounded shoulders and either flaring or collared rims. Rim designs include incised crosshatching on rims of both forms. Horizontal bands of cord impressions on the collared rims are commonly interrupted by four equally spaced cord-impressed triangles with an apical node on the vessel lip. Both shoulder patterns of the preceding Chamberlain Aspect occur with only minor differences in the application of the elements (see fig. 15).

Aside from pottery, material culture includes each of the categories listed in the preceding section for the Chamberlain Aspect, with no significant additions that cannot be attributed to vagaries of preservation and accidents of discovery. These are, for the most part, artifact classes which are generally rare and which might not be recovered in a partially excavated site.

No exhaustive count of these sites has yet been made, but it is probable that they are well in excess of one hunderd. Spatially, they occupy a vast geographic range along more than 500 river miles of the Missouri Valley trench (see map 20). The homogeneity of the cultural inventories of these sites is such that Will and Hecker (1944, pp. 10, 58) saw "no perceptible variation" despite the distances separating them. This conclusion was largely supported by the comparison of the frequencies of elements in the type site, Thomas Riggs, and the Paul Brave Site, separated by a distance of more more than one hundred airline miles (Wood and Woolworth, 1964,

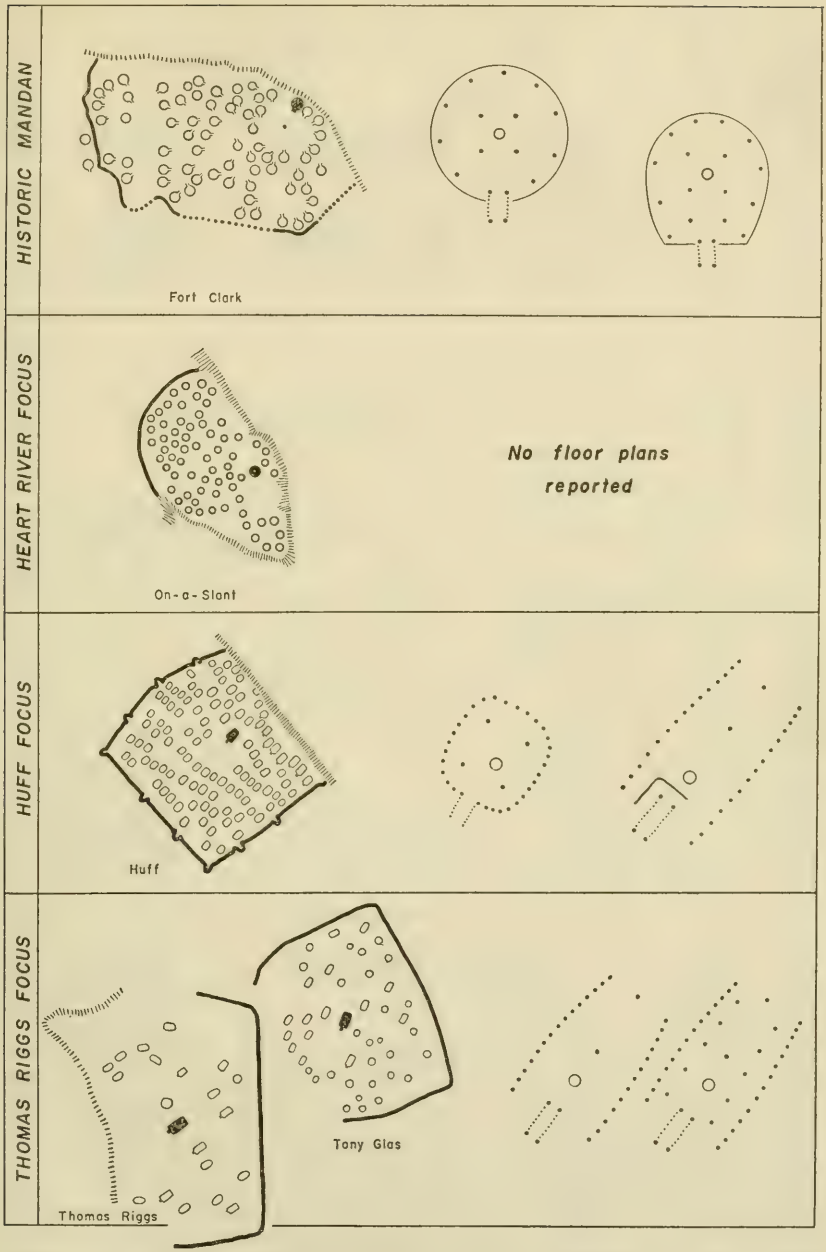


FIGURE 14.—Village plans and characteristic house types (various scales).

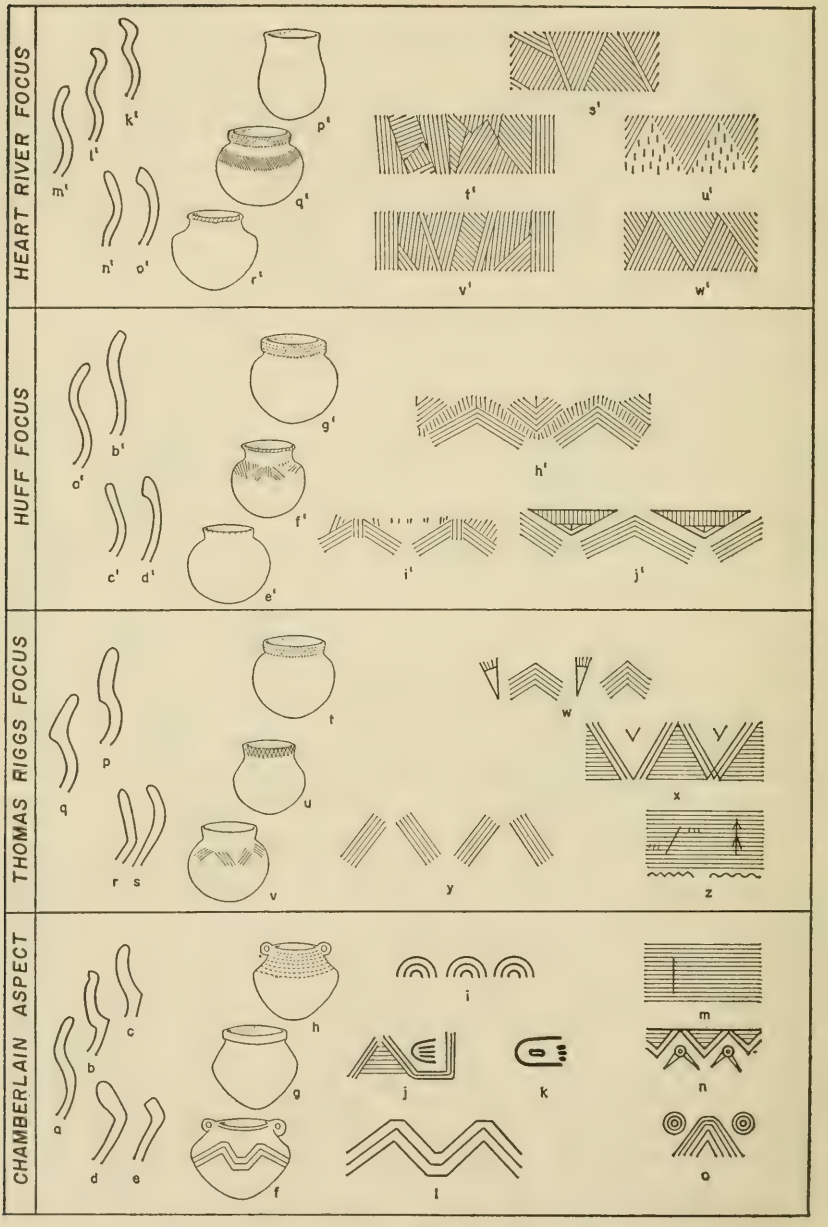


FIGURE 15.—Characteristic pottery rim profiles, vessel shapes, and shoulder patterns (various scales).

tables 4, 5). The consistent similarities in these widely distributed sites are taken to indicate near contemporaneity. Obviously, it is unlikely that all, or even most of them, were occupied at the same time, but their homogeneity is strong evidence that they may be bracketed within a relatively brief period, here estimated between about A.D. 1100 and 1400.

The southernmost of these sites in South Dakota geographically overlap with the western extension of sites of the Chamberlain Aspect (maps 19, 20). To date, there is only one reported instance of the superposition of a Thomas Riggs component over a Chamberlain Aspect manifestation, at the Hickey Brothers Site, 39LM4 (Caldwell, Madison, and Golden, 1964). In this instance, the lower component is either a Monroe or an Anderson Focus occupation. This direct evidence corroborates a number of lines of evidence invoked earlier that seemed to demonstrate that Thomas Riggs was the more recent, the most compelling of which are the Carbon-14 dates. On the other hand, the more centrally located and northernmost of the Thomas Riggs Focus Sites are not known to be stratigraphically underlain by any sedentary village horizon. There is an abrupt appearance of the focus in the northern Dakotas which postdates the earlier occupation of the area by local Woodland groups, and in this area the focus must be presumed to derive from elsewhere. The evidence that these sites may be traced from the culturally similar and temporally precedent Chamberlain Aspect is, to a large degree, circumstantial, but the hypothesis has the virtue of economy. Further, it correlates not only with the Mandan migration traditions themselves, deriving them from the southeast and downriver, but with inferences drawn by each ethnographer who has concerned himself with analyses of their social and ceremonial activities, from Lowie's early fieldwork until Bowers' more recent investigations.

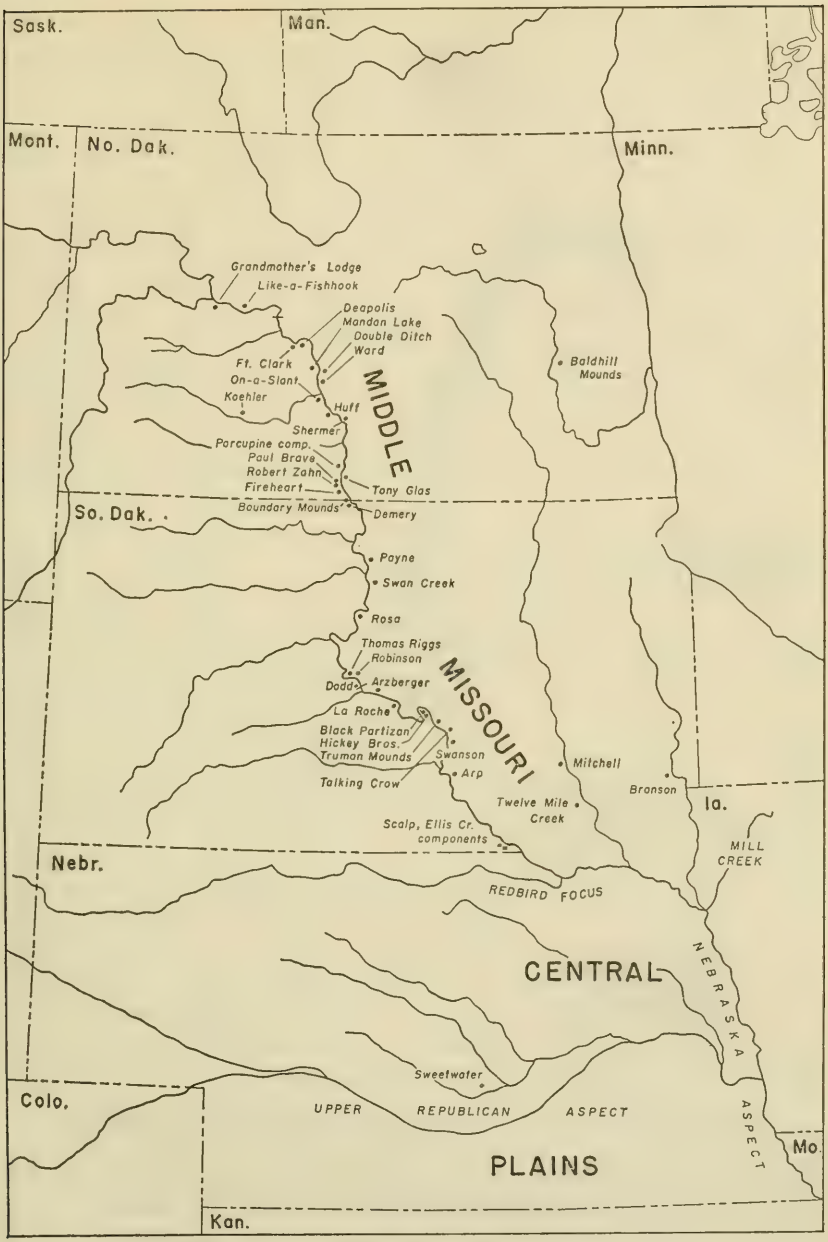
On the basis of the archeological record alone, the cultural and temporal relationships between these two complexes assume the following pattern: (1) The sites of the Chamberlain Aspect are more nearly like Thomas Riggs Sites than those of any other known preceding complex, (2) the Chamberlain Aspect is earlier in time by several centuries than the Thomas Riggs Focus, and (3) the differences between the two complexes in most instances reflect a more widespread pattern of change in the Plains. Briefly, the Chamberlain Aspect fulfills virtually every requirement necessary for an antecedent for Thomas Riggs. This assertion, however, should not be interpreted to mean that there are not very real differences between them.

The basic similarities between the complexes lie in their economic orientation, domestic architecture, and the basic kit of tools of all categories. The degree of difference is such as one might expect

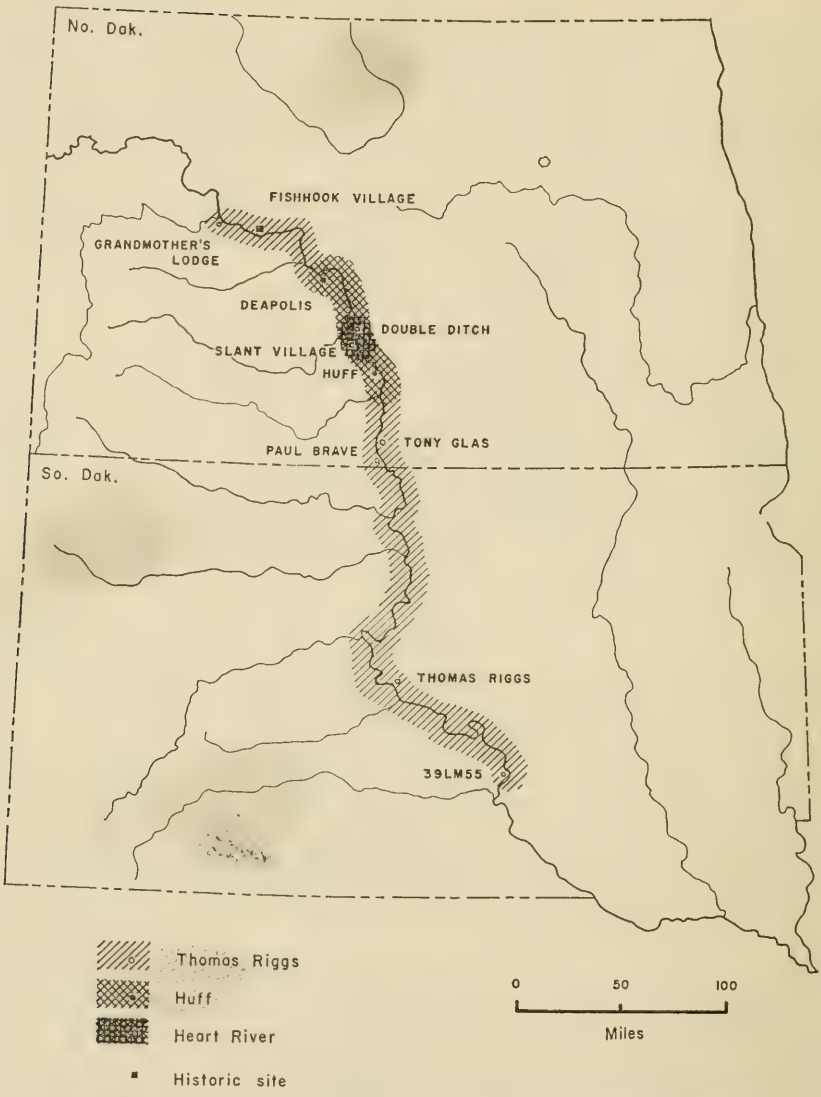
between two related groups separated by a gap in time: the major facets of both complexes are the same, the differences lying in minor changes in techniques of manufacture, a great many of them ceramic. First, there is but one shaping technique in Chamberlain Aspect pottery making; malleation with a cord-wrapped paddle. Vessels of the Thomas Riggs Focus have been malleated with a grooved paddle, with less than 3 percent of the pottery being cord roughened. Except for the loss of angular shoulders in Thomas Riggs, vessel form remains constant, and there is continuity in the shoulder patterns between the complexes, although in the later manifestations incised shoulders become more popular than broad-trailed patterns. Rim forms also change: there are fewer rim forms and they are more standardized, and the decorations applied are fewer and more standardized. The flaring rims of the Chamberlain Aspect become higher and less ornate, and the S-shaped rims are thickened at the base and become collared, and the rolled lips of the Chamberlain Aspect are lost (see fig. 15). At the risk of simplification, such types as Foreman Cord Impressed, Foreman Plain, and Kimball Modified Lip are similar to the Thomas Riggs types—Fort Yates Cord Impressed, Riggs Plain, and Riggs Punctate.

The generalization that ceramic changes occur at a much faster rate than nonceramic changes is directly related to the extreme plasticity of clay. Accordingly, a gap in the archeological record is certain to be detected in a corresponding gap in a ceramic sequence. The patent similarities between the two ceramic complexes are, therefore, tempered by the distinct break between them in two significant ways: (1) by the shift in technique of manufacture from the use of a cord-wrapped paddle to the near-extinction of this implement in preference to a grooved paddle, and (2) by the use of fewer and more standardized decorative techniques.

The range of dates now available for the Chamberlain Aspect, from A.D. 719 to 1158, covers a 450–year period, during which we might expect more diversification of a complex than we find in the Thomas Riggs Focus, here estimated to range from A.D. 1100 to 1400. The dates available do not now cluster but are spread over a long timespan with few gaps, but to judge from the ceramic record there is a distinct diastema not covered by reported sites. If the hypothesis of transition between the Chamberlain Aspect and the Thomas Riggs Focus has any validity, we should expect to find the transitional sites in the overlap zone of these complexes (maps 19, 20) in the vicinity of the Big Bend of the Missouri River. This particular area is one of the least-known portions of the Missouri River trench, but it has recently been opened to archeological investigations under the spur of the construction of the Big Bend Reservoir, which will ultimately inundate



Map 19.—The Central Plains and Middle Missouri regions showing the location of various sites discussed.



MAP 20.—Contraction of the Mandan habitat, showing certain sites.

virtually this entire critical area. It is hardly surprising to find that transitional sites are presently lacking. There are, perhaps, more than a thousand major village sites along the Missouri River in the Dakotas, excluding smaller settlements which may be deeply buried and have escaped detection, or others which have been cut away by the river—and less than 5 percent of the known sites have been tested.

In sum, the Chamberlain Aspect is the most likely candidate for an antecedent for the Thomas Riggs Focus. The differences between the

complexes may be laid to three factors: internal change, outside contacts, and the suspicion that there is a period for which we lack an archeological record. It should be understood that the major distinctions between the complexes lie in pottery, a technological field which is notable for its sensitivity to impacts of many kinds.

As a hypothesis for further investigation, it is postulated that contacts with outside populations led to the replacement of cord-wrapped paddles by grooved paddles. The immediate stimulus for this change may lie in certain of the local Woodland groups. Attention is immediately directed to the Truman Mound Group population who used grooved pottery paddles, although it is equally possible that both of these groups may have acquired this pottery-shaping technique from another and as yet unknown complex. Contact with Upper Republican manifestations in the Central Plains is intimated by some of the pottery in the Chamberlain Aspect Swanson Site, but these contacts seem to have had little lasting effect.

The Thomas Riggs Focus emerged from the Chamberlain Aspect mold as a distinctive, homogeneous complex, a circumstance which suggests that the latter complex derived, perhaps, from one segment of this aspect. Despite the regional differences in the Chamberlain Aspect, the emergent Thomas Riggs Focus was a homogeneous group which, throughout its distribution, shares a remarkably similar stamp of manufacturing techniques.

This emergence was perhaps completed by about A.D. 1100, and this complex moved into more northern areas up the Missouri Valley trench until it reached the limit of aboriginal maize horticulture. This movement seems to have encountered little if any initial opposition, to judge from the relative scarcity of fortified sites. This "conquest" of the Northern Plains appears as relatively sudden. Whether this was a massive entry through an ecological funnel, a consequence of the disintegration of the prior complexes, or some other reason, the archeological data presently at hand must be augmented, for it is insufficient to hint at the reason now. Once established in the Northern Plains, the people dwelt peaceably for a time until, as the fortifications at Tony Glas indicate, contacts were again made with hostile populations, and the plateau of cultural stability that had been attained was disrupted by new migrants moving up the Missouri Valley, with whom contacts were to have far-reaching effects.

HUFF FOCUS: ACCRETION

The Huff Site provides the basic data for the next period of Mandan prehistory, a role which it has retained since the first synthesis of Mandan archeology by Will and Hecker (1944). This large and

striking village site, a few miles south of the mouth of the Heart River in North Dakota, has been spasmodically investigated and interpreted for the past half century, this study comprising the latest such work. This village was dated by tree-ring cutting dates between A.D. 1485 and 1543 (Will, 1946, pp. 15–16), and a mean date of A.D. 1500 for the occupation appears to be acceptable pending substantive tree-ring analysis and Carbon-14 age determination. This large site served as the type site for Will and Hecker's "Middle Mandan" period (1944), and for Bowers' "Huff Focus" (MS. b, pp. 84–91), the latter designation having been adopted for the complex represented at this and related villages.

The Huff Site now consists of an area 8.5 acres in extent, containing 103 dwellings, although originally it is estimated to have encompassed 10 acres and 115 houses. A rectangular fortification ditch, augmented by an interior earthwork supporting a bastioned palisade, enclosed the long-rectangular and subrectangular houses. The houses are set in rows or lanes roughly parallel to the riverbank, with entrances facing the southwest and away from the river. There is a large long-rectangular structure northeast of an open plaza in the center of the village which is identified as the ceremonial lodge (see map 4).

The diffuse nature of the Thomas Riggs Focus components, spread thinly over a distance of more than 500 river miles, contrasts markedly with the limited distribution of the Huff Focus, clustered in less than one hundred miles of the Missouri River valley between the mouths of the Cannonball and Knife Rivers in North Dakota. This distribution reflects a withdrawal from the more northernly sites as well as an even more dramatic abandonment of the villages farther down the Missouri River (map 20). The constriction of this habitat is seen to parallel the grouping in much larger and correspondingly better fortified settlements. The village and fortification plan at Huff is a striking departure from the open Thomas Riggs villages, but it is one which is anticipated in the Tony Glas Site in which, however, the bastions so prominent at Huff are conspicuously lacking (see fig. 14).

Differences between the Thomas Riggs and Huff Foci are not striking. Architecturally, Thomas Riggs houses differ in having the house center post exactly midway between the entrance and the rear supporting post; at Huff, this post is offset toward the back of the house. The intermediate rows of five posts between the sidewalls and the house midline, noted at Paul Brave, are lacking at Huff (fig. 14). These differences are rather minor, however, for the floor plans of houses in both foci would require very much the same sort of superstructure. There is, however, concrete evidence

of change in the distinctive House 12, a subrectangular structure supported by four center posts set around a central fireplace, with closely set vertical wall posts along each of the four gently convex walls (fig. 14). This house type, wholly alien to the preceding and contemporary dwellings in Thomas Riggs and Huff, is clearly derived from complexes farther south, in central South Dakota.

The nonceramic artifact classes at Huff are virtually all carryovers from the precedent Thomas Riggs Focus. There are a few new items, such as grooved ironstone nodules and diorite axes, but the continuity between the two foci is patent, for the inventories approach identity. There are a few distinctions in the pottery, but even here continuity is obvious. There are four pottery wares at Huff: Fort Yates and Le Beau S-Rim wares, both with S-shaped or recurved rims; and Riggs and Stanley Braced Rim wares, both with straight to flaring rims.

Riggs Plain, Riggs Decorated Lip, and Riggs Filleted are all carryovers from the Thomas Riggs Focus, but at Huff they occur in slightly different frequencies, and two of the Riggs Ware types, Riggs Incised and Riggs Pinched Rim (Wood and Woolworth, 1964, p. 20) have been abandoned. The number of flared-rimmed types was not reduced, however, for two new types were added. Stanley Tool Impressed and Stanley Plain vessels had been added to the inventory, both of them types of Stanley Braced Rim Ware (Lehmer, 1954 a, pp. 45–46), best known from sites in central South Dakota. The Stanley Braced Rim Ware types at Huff are upriver varieties of the South Dakota types; but they are not simple importations, for they vary from the southern varieties in several respects—at Huff the strap handles so popular in the south are lacking, the bracing is less conspicuous, and the vessel necks are less commonly brushed. The flared-rimmed types, therefore, show both continuity and discontinuity from the precedent Thomas Riggs Focus types. Some of the Riggs Ware types persist almost unchanged, and others are abandoned at the same time that bracing is added to the flared-rimmed types which remain—the inspiration for the bracing coming from a source alien to the Thomas Riggs Focus.

In the types with S-shaped or recurved rims, other changes are taking place. All the types of the Fort Yates Ware from the Thomas Riggs Focus carry over into Huff—Fort Yates Cord Impressed, Fort Yates Incised, and Fort Yates Plain—although the Huff varieties are somewhat different in rim conformation from those in Thomas Riggs. The thickening or collaring of the lower margin of the convex upper rim has all but vanished, resulting in an S-shaped rim that is of nearly equal thickness from the lip to the shoulder. Furthermore, the neck is higher and less constricted, giving the rims a flatter pro-

file. This modification of the rim profile led, in some cases, to an essentially new rim form, sufficiently distinctive that it is assigned to a different ware, Le Beau S-Rim Ware. The new rim form can be likened to an S-shaped rim in which the neck, or concave lower part of the S, has been replaced by a high, nearly vertical neck, the height of which is now greater than that of the convex upper rim. Although the statement might be misleading, it might be said that the rim is not set on the shoulder, but on an intervening cylindrical neck. The one component type of this ware at Huff, Le Beau Cord Impressed, derives directly from the earlier type with S-shaped rims, Fort Yates Cord Impressed. There is every gradation in rim form from the low S-shaped rims to the newer, high-S rim form of the Le Beau variety. The latter rim form, more common and even more pronounced in the Heart River Focus Sites (Will and Spinden, 1906, pl. 37, *a*), is characteristic of historic Mandan pottery. The braced rim types similarly carry over into Heart River Focus Sites, providing clear evidence of the intermediate position of Huff in this sequence.

Continuity in shoulder patterns on the pottery, however, is lacking, for there are few resemblances between the shoulder patterns of Huff and those of either the Thomas Riggs or Heart River Focus. Both Thomas Riggs and Huff used abstract geometric patterns, but there are no detailed resemblances beyond the use of chevrons and a carry-over of a modified "bear-foot" element into Huff (see fig. 15, *j*, *k*, *w*) Another shoulder pattern typical of Thomas Riggs, involving a horizontally incised shoulder (fig. 15, *z*) was lacking at Huff. Also, the rare check-stamps and cord roughening of Thomas Riggs components do not occur at Huff.

Most of the nonceramic traits carry directly through from Thomas Riggs to Huff, including such exotic items as shell thunderbirds as well as the more homely bone awls and most of the classes of bone, stone, and antler artifacts. Among items lacking at Huff that occur in Thomas Riggs sites, however, are: scapula hoes notched at the glenoid, scapula hoes with pierced blades, split tibia picks, beamers, fishhooks, bone knife handles, grooved and lipped axes, and antler "bow guards." The absence of a few other usually rare artifacts may be apparent rather than real, inasmuch as these items do not occur universally even in Thomas Riggs sites.

In addition to the differences already cited between Thomas Riggs and Huff, it is now relevant to add at least two others. First, there is the addition of the four-post house to the existing long-rectangular house tradition. The source for this house without doubt is down the Missouri River, from a source not unlike the Arzberger Site, which is estimated by Spaulding (1956, p. 110) as "approximately on the boundary between the fifteenth and sixteenth centuries," or roughly

coeval with Huff. This estimate has been corroborated by two Carbon-14 dates of A.D. 1461±150 and 1531±200 (samples M–1126 and M–1126a, determination by the Radiocarbon Laboratory, University of Michigan, for the University of Nebraska, in conjunction with the Missouri Basin Chronology Program).

Spaulding (1956, p. 168, pl. 14, *a–e*) reports five cord-impressed rim sherds from Arzberger which he identifies as trade sherds. Two of these five rims are obliquely impressed; one of the two (pl. 14, *a*) can be duplicated in the Huff collections, but the other (pl. 14, *b*) is unlike other cord-impressed Huff rims. Spaulding says that:

> In form all are slightly convex and were probably faintly S-curved rims on the general order of rim form 74 . . . . Thickness about 1 cm. below the lip ranges from 5 to 7 mm., but two sherds are slightly thicker towards the base than they are at the lip. [Spaulding, 1956, p. 168.]

If I interpret this statement correctly, it suggests that the rims were perhaps more "collared" than S-shaped, a circumstance which recalls the Fort Yates Cord Impressed type from Thomas Riggs components more than the rims from Huff, which are consistently the same thickness from just below the lip to the shoulder. Therefore I would be more inclined to derive the Arzberger cord-impressed rims from a Thomas Riggs source than from Huff. Another reason for this inclination is the fact that there is a large percentage of cord-roughened sherds at Arzberger, a few at both the Thomas Riggs and Paul Brave Sites, but none at Huff.

Check-stamping was present in some abundance at Arzberger. Bowers (MS. a) reported this body treatment from Huff, but check-stamped sherds were totally lacking in the samples excavated in both 1959 and 1960. It is felt to be significant that check stamping was present, but rare, in the Thomas Riggs component at the Paul Brave Site (Wood and Woolworth, 1964, p. 24, pl. 6, *d*). One last comment in this vein is concerned with the pendant cord-impressed triangle on one of the Arzberger rims (Spaulding, 1956, pl. 14, *b*): this feature is wholly lacking in both the Thomas Riggs and the Huff Foci. Altogether, however, the data suggest that the source for the atypical rim sherds at Arzberger derive from the Thomas Riggs Focus rather than Huff.

Nevertheless, Arzberger and certain related sites remain central in the problem of deriving the Huff four-post house, for the Arzberger population was apparently shifting their preference in dwellings from a four-post, subrectangular form to a four-post circular lodge. This transition has been recorded in two other sites in the Middle Missouri area: Talking Crow Site, Component D (C.S. Smith, personal communication), and the Black Partizan Site, 39LM218 (Caldwell, 1960, pp. 54, 56), both of which seem to represent an

early development within the Campbell Creek Focus, a complex not distantly related to Arzberger. It is clear that the Huff house type was adopted from a downriver complex which had not yet fully evolved the circular house type.

The Arzberger Site itself seems excluded as a source, to judge from a few incised rim sherds and handles at Huff which are interpreted as trade pieces and which may be taken to suggest the source of the Huff four-post house. One pinched and incised rim from Huff (pl. 9, *g*) resembles specimens from the Robinson and La Roche Sites of the La Roche Focus in central South Dakota (George, 1948, p. 25; Meleen, 1948, pl. 2, 7). One horizontally incised rim, vertically brushed, suggests the La Roche type Nordvold Horizontally Incised (Hurt, 1957, pp. 44–45). Two incised strap handles and the rare brushed rim sherds from Huff are similarly out of place but they, too, resemble La Roche ceramics. In sum, the atypical Huff pottery and architecture appear to derive from a Campbell Creek Focus and La Roche Focus provenience, but to date there are no reported sites which provide a clear source for *both* the four-post house and the trade pottery.

There is also clear evidence of other and later contacts in the dominant local wares at Huff. The Stanley Braced Rim Ware types at Huff are not only indicative of close contacts with early Arikara populations farther down the Missouri River, but they provide additional evidence of the temporal proximity of Huff to the protohistoric Mandan villages, in which braced rims occur—albeit rarely.

In addition to these contacts, *Dentalium* and *Olivella* from Huff imply contacts with western nomadic groups who were importing these marine shells inland by group-to-group trade from the Pacific coast in prehistoric times. This matter is taken up in some detail in later pages.

There has been ample speculation in the past on the origin of the fortification system at Huff, the principal hypothesis being that it derives from Middle Mississippian sources in the Eastern Woodlands. The principal source suspected is Aztalan, a village on the Rock River some 30 miles west of Milwaukee, in southeastern Wisconsin (Barrett, 1933). The Huff fortification, as Spaulding (1956, p. 104) observed, is a miniature Aztalan, particularly in the conformation of the village outline, the presence of bastions, and the fact that a stream forms one edge of the village. This form of fortification, common enough in the Mississippi Valley, may have entered the Middle Missouri area by way of the Missouri River trench in southeastern South Dakota. Keyes (1927, p. 225) reports two Mill Creek Sites in northwestern Iowa that are not only rectangular in plan, but are enclosed by a broad ditch. Fortified sites with bastions

are as yet unreported outside of the immediate vicinity of the Missouri River valley in the Dakotas, supporting the hypothesis that this village feature was diffused north along the Missouri River to such sites as Huff. Smithsonian Institution, River Basin Project, field parties have recently found sites in the Big Bend Reservoir, on the Missouri River below Pierre, S. Dak., that superficially resemble the Huff village pattern. One such site, Black Partizan (39LM218), is still under analysis (Caldwell, 1960, pp. 53–57), but promises interesting leads in this matter.

The cultural differences which distinguish Huff from the precedent Thomas Riggs Focus are suspected of having been derived from down the Missouri River trench, from sites affiliated with the Campbell Creek Focus and the La Roche Focus. The four-post house and several atypical rim sherds believed to be trade pieces point to these sources as the stimuli for the Huff novelties. The distinctive fortification system at Huff is believed to derive from sites of uncertain affiliation along the Missouri River to the south and within the range of the distribution of the La Roche Focus. There is no reason to derive it overland from such Middle Mississippian sources in the Eastern Woodlands as Aztalan. The Middle Mississippian overtones at Huff are felt to have diffused north along the same route by which the Mandan reached North Dakota—up the Missouri River valley.

The complex represented by the Thomas Riggs Focus is continued at Huff, and the changes in material culture in part bridge the gap between Thomas Riggs and the late Mandan sites now to be discussed. The conclusion that Huff represents a complex in a state of change is inescapable. Precisely which of the changes can be attributed to internal momentum and which to external contacts remain to be determined except in the case of the newly adopted four-post house and a few pottery traits, but the outstanding changes seem to be the result of outside contacts.

HEART RIVER FOCUS: COALESCENCE

A number of excavated and reported sites are in the vicinity of the mouth of the Heart River which postdate the Huff Site, and are identified as protohistoric and historic Mandan villages. These include the Double Ditch, or Bourgois Site, 32BL8 (Will and Spinden, 1906); On-a-Slant Village, 32MO26 (Strong, 1940); and the Koehler Campsite, 32GT1, a transient settlement on the Heart River (Cooper, 1958). These and other sites at the mouth of the Heart River, collectively designated the Heart River Focus (Bowers, MS. b, pp. 83–84), are the "Later Heart River" sites of Will and Hecker (1944). They are located within a 20-mile radius of that river, and represent

a further contraction of the Mandan territory (map 20). The Hidatsa arrival on the Missouri River about A.D. 1650 (Bowers, MS. b) may in part be responsible for the abandonment of sites as far north as the Knife River.

The shift from long-rectangular to circular dwellings (Will and Hecker, 1944, p. 66) seems to have taken

> place about the same time as the concentration of the population into six villages near the Heart River and apparently the greater part of the change occurred when those villages were first built. Rectangular [house types were present in both the Thomas Riggs and Huff foci, but] several villages whose ceramic types closely precede the . . . Heart River period types apparently have both lodge types present in the village. This condition appears to exist in the Mandan Lake and Ward sites [32OL21 and 32BL36].

The Double Ditch Site is a large, fortified circular earth lodge village consisting of two concentric ditches enclosing a large number of dwellings placed in no apparent order. The village plaza is on the northeast edge of the site, now between the two fortification ditches. The village lacks prominent bastions, and the excavators report no palisade on the inner side of the ditch. If it was present at all, it was likely outside the ditch. The palisade at Huff was *inside* the ditch, as it is in most of the fortified vallages in the Dakotas, but in the historic Mandan sites the references are consistent in stating that it was *outside* the ditch (p. 17). The shift in location apparently dates between about A.D. 1500 and 1700. Another change is the fact that most of the houses now face the village plaza, whereas previously they all faced the same direction as that assumed by the ceremonial lodge. The most striking feature of this site, apart from its large size, is the tremendous accumulation of refuse middens, some of them more than 7 feet high. Middens are also characteristics of other local and presumably contemporaneous sites such as Boley, Motsiff, and Sperry. Apart from the pottery, there are no significant differences in the artifact inventories of Double Ditch and Huff. There were stone game pieces which resemble the embellished bone pieces from Huff, and there was a carved bone baton (Will and Spinden, 1906, fig. 11) which resembled a crane's head, and only a few other minor differences insofar as the stone, bone, and shell work is concerned. A significant addition is catlinite, which must have reached these villages from trade with the Arikara, who in turn derived it from the Dakota in southwestern Minnesota—southeastern South Dakota (Ewers, 1954, p. 440).

Most of the pottery from Double Ditch is S-shaped and cord impressed, but only a few pieces closely resemble those from Huff. The Double Ditch S-shaped rims carry more intricate decorations executed with a smaller cord, and cord-impressed triangles are superseded by cord-impressed "rainbows." Many of these S-shaped rims have thick-

ened lips. There are a few braced rims at Double Ditch, but only a few of them parallel the Stanley Ware rims at Huff, the rest of them being obliquely cord impressed, an attribute lacking at Huff. The shoulder patterns at Double Ditch do not closely resemble those at Huff, the Huff chevrons and "bear foot" elements giving way to intricately incised panels of vertical columns of elements (see fig. 15). Check stamps, lacking in Huff, are present but rare in Double Ditch.

A campsite, some distance west of the Missouri River, on the north bank of the Heart River, was reported by Cooper (1958, p. 33), who states:

> The artifact inventory, while leaving much to be desired from the standpoint of quantity and range of forms, seems to point unmistakably to a close relationship with certain sites . . . near the mouth of the Heart River . . . in view of its location, its general character, and its apparent cultural relationships . . . the Koehler site was a recurrently occupied hunting camp of a people closely related culturally to the occupants of the Double Ditch site.

The Mandan affiliation of both the Double Ditch earth-lodge village and the Koehler campsite seems assured by Strong's assertion that On-a-Slant Village, identified as Mandan by one of Lewis and Clark's informants, is virtually culturally identical to Double Ditch (Strong, 1940, p. 363). Will and Hecker (1944, p. 35) report that On-a-Slant Village and Sperry are the earliest Mandan sites in which horse bones are found.

Cultural continuity from sites of the Thomas Riggs Focus to the historic Mandan has been shown by investigations in the intermediate site of Huff. Links in this sequence are of course still lacking. Huff provided much-needed data on the important "Middle" period of Mandan prehistory, but what is now necessary are data from either deep and stratified sites or separate component sites, both earlier and later than Huff. Such sites will provide more insight into the adoption of the circular earth lodge by the Mandan, a process which was completed between the time of Huff and Double Ditch; and provide data relevant to internal change and outside contacts which modified the Huff complex into the culture borne by the Mandan at the time of the first European contacts, when the first description of these sedentary folk was set down by eyewitnesses.

HISTORIC MANDAN: ACCULTURATION

The history of the Mandan after about 1797 is less a matter of archeology than of historical chronicle, for there are no systematically investigated Mandan villages between the time of the occupation of On-a-Slant Village and the Mandan merger with the Hidatsa at Like-a-Fishhook Village between 1845 and 1858. This section briefly discusses the movements of the tribe during this period and a few archeological observations based on the limited data available, and

concludes with the transformation of the group into reservation Indians.

In 1773 the Mandan were in the vicinity of the Heart River, living in 9 to 13 villages on both sides of the river in sufficient number to raise several thousands of warriors (Schoolcraft, 1851–57, vol. 3, p. 253). As Bowers (1950, p. 10) has pointed out, the Mandan have never claimed as many as 13 villages, and he presumes that this reference includes both Mandan and Hidatsa groups. There are no accounts of the Hidatsa predating 1797, when David Thompson (1916) recognized that the Hidatsa were a group separate from the Mandan, although they were living in three adjacent villages. The date 1797 accordingly has been used here as the beginning of the historic period. The Mandan villages were reorganized after the severe smallpox epidemic in the late 18th century, and villages on both banks of the Missouri River moved north and banded together for mutual assistance against the mounting depredations of the equestrian and nomadic Dakota who, "From the viewpoint of the agricultural tribes . . . were to be classed with the smallpox, the drought, and the grasshopper, as one of the great plagues of existence," as Will and Hyde (1917, p. 45) tellingly observe. The Mandan ultimately settled near the mouth of the Knife River at Fort Clark (32ME2) and Deapolis (32ME5). They were visited at Fort Clark by Catlin in 1832 and Prince Maximilian in 1833.

The site at Fort Clark is now a State park under the supervision of the State Historical Society of North Dakota, but Deapolis has been obliterated by an encroaching gravel pit. Working in advance of the draglines, two enthusiastic and conscientious Bismarck collectors, Ralph S. Thompson and Roger E. Holkesvik, recovered a large quantity of specimen material from this site, which they generously permitted me to inspect and photograph.

Trade goods are abundant at Deapolis and include virtually all varieties dispensed by the local fur traders, but native goods are still very much in evidence. Steel hoes and arrowpoints have largely replaced native-made items, but the pottery from the site closely resembles that from Double Ditch and On-a-Slant, although it is less carefully made. Three items of particular interest from Deapolis are scapula hoes with the articular end chopped away, a large series of ice gliders cut from bison ribs, and a small model of a horse of baked clay which had been set on stick legs. Such items have been found in Arikara sites (Lehmer, 1954; Fenenga, 1954; and Wood, MS. a), but were previously unrecorded for the Mandan. Exclusive of the trade goods, most of the remaining artifacts can be duplicated in the Double Ditch and On-a-Slant Village collections except for a number of peculiar items made from bison ribs, which are probably

part of the runners for dog sledges as illustrated by Bodmer (Wied-Neuwied, 1906, vol. 25, pl. 29). The only other reported examples of artifacts of this nature are those described by Lehmer (1966, pp. 46–47, pl. 14, *a*) from the historic Arikara component at the Fire Heart Creek Site (32SI2).

The Mandan remained at Fort Clark until the smallpox epidemic of 1837, at which time they were virtually annihilated; soon afterward they joined the Hidatsa in the establishment of Like-a-Fishhook Village, well above the mouth of the Knife River. Extensive excavations have been conducted at this large village and in the associated trading posts of Fort Berthold I (1845–62) and Fort Berthold II, or Fort Atkinson (1858–ca.1890). The reports of the work done in the Mandan and Hidatsa sectors of the village are not yet published (Howard, MS.), but historical records and the work in the Arikara sector of the village suggest that the Mandan and Hidatsa were undergoing virtually the same acculturative processes as the Arikara. The following interpretations are based, then, on the assumption that the Arikara material excavated in 1954 (Wood, MS. a) may be extended to include the Mandan and Hidatsa, the validity of which must be assessed when the Mandan data become available. G. H. Smith, who is currently correlating the massive archeological program which was carried out there, informs me (personal communication) that the "Mandan" remains excavated at Like-a-Fishhook Village seem to be indistinguishable from the "Hidatsa." He feels that by 1845 the two tribes, to all intents, were one people.

After the founding of Fort Clark in 1831 near the mouth of the Knife River, the Mandan, Hidatsa, and Arikara seem to have adjusted to a new pattern of export trade, and to have become almost wholly dependent upon trade with Whites for their very existence. At Like-a-Fishhook Village continuous trade firmly established the dependent nature of the native groups, although the trade itself had already begun its permanent decline. The traders had been supplying many of the material wants of the Indians, including textiles and food. The natives became increasingly dependent on the trader for household utensils, tools and weapons, and garments. Native dress, for example, quickly waned, leaving only vestiges of native traits which rapidly became essentially heirloom goods. Like-a-Fishhook Village is a critical site in the histories of the Three Tribes, for it was the last village in which native lifeways were followed and it was here that the transition to a "reservation" people was begun and largely completed. Although the details are poorly documented, the role of the White trader in this transition was probably much greater than that of missionaries and the Indian Agency officials (Smith and Woolworth, MS., pp. 16–18).

When the Mandan and Hidatsa moved to the site of Fishhook Village, they enclosed their circular earth lodges with a palisaded and bastioned fortification south of the site of Fort Berthold I. When that fort was razed by the Dakota in 1862, the ground occupied by the fort and adjacent land was taken over by the Arikara, leading to the unique circumstance of a historic White site being stratigraphically overlain by an Indian occupation site. The earth lodge of the Three Tribes was here supplemented with auxiliary log cabins, or replaced by them. Storage continued to be made in bell-shaped cache pits, but despite the availability of shovels these pits were still being dug with hoes. Hoes now were predominantly of steel, for although Matthews (1877, p. 19) reports a great number of bison scapula hoes in use at the village, only one such tool was recovered in the Arikara sector. Native-made items are rare, including only a few examples of chipped stone blades, arrowpoints, choppers, cobble hammerstones, and abrading stones, although grooved mauls were relatively abundant. Pottery making had been virtually abandoned by the Arikara, although work in the Mandan-Hidatsa sector of the village recovered a number of sherds. A number of aboriginal items were now being made from White-introduced materials: steel arrowpoints in place of stone, gun-barrel fleshing tools for the serrated elk cannon bone flesher, and glazed earthenware game pieces for the native pottery or bone disks.

The conditions under which trade with the natives was carried out illuminate some of the processes of culture change at Fishhook Village. While the more conservative Indians must have been less receptive to many of the White items, in time of famine and poverty all individuals obtained whatever they could from the Whites. The Indians, particularly the Mandan, were resentful of the Whites after the tragic epidemic of 1837, but the dependence on the traders kept this resentment on a verbal level. There were probably no more than 8 or 10 Whites at Fishhook Village at any one time, including half-breeds and excluding the military occupation of Fort Atkinson from 1864 to 1867. These men were largely responsible for the welfare of the perhaps 1,500 members of the Three Tribes.

The Indians were closely confined to the village and, except for war parties, rarely ventured far from their homes. There were large numbers of well-armed Dakota in the vicinity who awaited just such movements and promptly set upon hunters or others rash enough to venture out without heavy strength of arms. Until the Dakota were pacified, about 1878, the Three Tribes were forced to trade with the White companies at the village or risk death in an effort to trade elsewhere (Mattison, 1954, pp. 33–38). The traders at Fishhook Village, therefore, had an unwilling but captive audience, and were

able to retain a close and exclusive relationship with the Three Tribes, the extent of which may be judged by the fact that the Indian Agent for all of the tribes of the Upper Missouri from 1842 to 1846, Andrew Drips, was from time to time an employee of the trading company (Abel, 1932).

The Indians looked upon these Whites as poor men who could find no means of earning a living at home (Kurz, 1937, p. 114) and the Whites found it necessary to maintain as distinguished a role as possible in order to retain the respect of the Indians. Despite this attitude of superiority, the Indians strove for identification with the Whites, particularly in dress (ibid., p. 134). This fact, combined with the feeling that White goods were incomparably superior to native-made goods (ibid., p. 149) materially accelerated acculturation in this sphere.

The radical transition of native lifeways began about 1863, according to Matthews, who commented:

> Although these Indians have long known the Whites, it is only [after ca. 1864–65] that our intercourse with them has been sufficiently extensive to modify their customs and ideas . . . . Before the period to which I refer, we had . . . wrought little change in their minds or manners . . . . The conservatives were still much the same as their grandfathers were. [Matthews 1877, pp. 29–31.]

The Three Tribes were the more tractable of the local tribes, and there seems to have been little overt reaction of a ceremonial nature involving contraacculturative movements. There have been few attempts to sponsor nativistic movements. Peyote was introduced about 1912, but soon languished, and the Ghost Dance, although it was accepted by the Three Tribes, never attained prominence (Mooney 1896, p. 817).

In 1883 the Indian Agent contemplated the distribution of the Indians on family land allotments, but fear of hostiles kept the Indians at Fishhook Village. In 1885 the Indian Agent was successful in his efforts to persuade two Arikara to move onto allotments and break ground. Fishhook Village was deserted by 1886, and the period of reservation life began (U.S. Bureau of Indian Affairs, 1883, p. 32; 1885, p. 30; and 1886, pp. 62–63). Fishhook Village provides a link between the basically unmodified villages of the 18th and 19th centuries and the modern Indians now living on the Fort Berthold Indian Reservation in the vicinity of this village (map. 20). This was the locale in which the Three Tribes lost their native heritage. Prior to their removal to Fishhook Village, they were still in a primarily aboriginal state. When they left, 20 to 40 years later, they had lost most of their material culture and a substantial segment of their behavioral traits. Their fortunes from that time to the present is a matter for study by disciplines other than archeology.

The Mandan, as a tribe, are now extinct, so thoroughly have they mingled with their White neighbors and adjoining Indian groups, and the generation of elders which can recall having lived at Like-a-Fishhook Village has all but vanished, leaving to the ethnographer the assessment of problems remotely, if at all, related to their separate histories.

CORRELATION WITH PRIOR SYNTHESES

Archeological data on the prehistoric village complexes in the Dakotas had been accumulating for half a century before George Will, assisted by Thad. Hecker, drew this literature and their own fieldwork together in a pioneer effort to bring a degree of order to the basic data. The several statments of their thesis (Will and Hecker, 1944, pp. 6–7, 117–118, passim), and a more recent study by Bowers (MS. b) are, for the most part, complementary. The present study abandons some of the prior terminology and retains others as follows:

Present terminology	*Will and Hecker*	*Bowers*
Thomas Riggs Focus	Archaic Mandan	Cannonball Focus.
Huff Focus	Middle Mandan	Huff Focus.
Heart River Focus	Later Heart River	Heart River Focus.
Historic Mandan	Decadent Mandan	

The present terminology abandons both prior designations for the first complex. There are many good reasons for jettisoning the connotations evoked by "Archaic," and the earlier designation of the complex here called the Thomas Riggs Focus as the "Cannonball Focus" was not supported by adequate description, and the priority of naming and describing the material falls to Hurt (1935). The Huff Focus was adopted from Bowers to the exclusion of "Middle Mandan," and I have preferred Bowers' Heart River Focus to the longer but synonymous "Later Heart River." The Historic Mandan comprehends the sites described as "Decadent Mandan."

It should be emphasized that the present study has not substantially changed the picture envisioned by these first syntheses. Will and Hecker viewed the horticultural "Archaic Mandans" as moving into the Dakotas and building small, unfortified settlements over a wide area. These people, and the "Middle Mandans" who derived from them, built long-rectangular houses widely separated in the site area. The advent of the middle period seems to be marked by larger villages and by the idea for the necessity of fortifying the villages, as well as by substantial ceramic changes. The growth of fortifications they traced from the irregular ditches in such presumably earlier villages as the North Cannonball Site (32MO1) to the "perfectly planned and executed" ditch at Huff. The transition from this middle period to the "Later Heart River" was marked

by the crowding together of the houses within a small village area, the shift from a long-rectangular to a circular dwelling, and the concentration of the formerly widespread villages into five or six villages in the vicinity of the mouth of the Heart River. The "Decadent" period follows the introduction of smallpox and European implements after about 1750.

Bowers' work along the Missouri River, at many of the same sites discussed by Will and Hecker, has corroborated this sequence with one substantial elaboration. He asserts that about A.D. 1500 the Mandan were divided into two regional groups, which he termed the Huff and the Lower Grand Foci. He continues:

> The division of the Mandan into two groups is consistent with native tradition that, when the southern group moved northward to the vicinity of Heart River, they found other Mandan already living there. The archeological evidence indicates that the southern group were the first to adopt the circular earth lodge and that the northern group adopted it between 1550 and 1600, retaining a modified rectangular lodge for ceremonial purposes thereafter until the native population moved onto the reservation. Whereas emphasis was on cord-impressed pottery at the Heart River, the southern group emphasized incised pottery (Bowers, 1950, pp. 16–17).

The supporting evidence for these statements is embodied in his unpublished doctoral dissertation (MS. b), and in the preliminary report by Strong (1940) on work at sites in the vicinity of Mobridge, S. Dak. The implications of his hypothesis have not been outlined here, but it is apparent that full publication of the supporting data should profoundly augment the Mandan sequence as it is now comprehended.

The culture history of this group may now be set in perspective against a broader synthesis of Plains prehistory advanced by Lehmer on two occasions (1954 a; 1954 b). Lehmer argues that there were significant differences between the basic sedentary complexes of the Middle Missouri area and those of the Central Plains. These differences he conceptualizes as two comparable but distinct cultural traditions. Sites in the Middle Missouri Tradition include those of the Chamberlain Aspect and later sites in the Dakotas with a long-rectangular architectural pattern, while the Central Plains Tradition includes those sites assigned to the Upper Republican and Nebraska aspects to the south. Lehmer and Caldwell (1966) and Lehmer (1966) have elaborated Lehmer's original proposal (see p. 113).

The contrasts between house types and settlement patterns are among the most striking differences between these two broad traditions, and he has detailed in convincing fashion other significant differences in their artifact complexes. Although it is unnecessary to enumerate the details here, this basic dichotomy of the Central Plains and Middle Missouri areas was not to be perpetuated into

the historic period. Following Wedel's (1941, pp. 25–26) ideas relating to the importance of Central Plains droughts and their probable importance in Plains prehistory, and citing Weakley's (1950) studies of climatic cycles in the Central Plains, Lehmer accepted the proposition that the Upper Republican occupation of the Central Plains was terminated by drought. In his words (Lehmer, 1954 b, p. 147) it is likely that:

> The Missouri River valley in South Dakota probably served as a refuge area for at least some of the emigrants from the drought-striken Central Plains. In contrast to the rivers of Nebraska and northern Kansas, which are mainly of local origin, the Missouri River derives a large part of its flow from the Rockies and hence would have been relatively unaffected by drought conditions in the plains.

Strong's description of the Arzberger Site (Strong, 1940, pp. 382–383) indicated to Lehmer that it was basically in the Central Plains Tradition, but with definite infusions of Middle Missouri Tradition traits. This instance not only supplies evidence of a movement into the Middle Missouri area, but

> They also serve to demonstrate that there was a considerable trait exchange between the immigrant and the native populations. This interweaving of the Central Plains and Middle Missouri fabrics appears to be responsible for the basic similarity of the later villages of both the Middle Missouri and Central Plains subareas, villages which appear to represent what might be called a Coalescent Tradition.
>
> The coalescence of Middle Missouri and Central Plains traits seems to have taken place in the southern part of the Middle Missouri area. The new complex presumably spread upriver from there, and also back into the Central Plains when the area was reoccupied. [Lehmer, 1954 b, p. 147.]

He continues with an account of similarities and distinctions between the later occupations of both areas, but concludes (ibid., pp. 148–149) that

> Despite this tendency to a certain polarity in the survival of Central Plains and Middle Missouri traits, the Coalescent sites show an undeniable basic similarity which contrasts sharply with the regional differences between the Central Plains and the Middle Missouri Traditions of the early part of the Sedentary Horizon.

The consequences of the intrusion of the Central Plains people into the Dakotas had important ramifications for the culture history of the village peoples living along the western margin of the Great Plains. The consequences so far as the Mandan are concerned are detailed in the pages that follow.

THE NATURE AND SOURCE OF CHANGE IN MANDAN PREHISTORY

The preceding synopsis of Mandan history and prehistory reveals in broad outline the general trends which we may expect future

research to round out and more fully document. The earliest sites which we may identify as culturally cognate with the Mandan with any degree of reliability, sites of the Thomas Riggs Focus, were postulated to have been derived from preceding village complexes in a manner not yet clear. The nature of the changes which mark the subsequent history of the derived Thomas Riggs Focus through the Historic Mandan is the subject of this unit and is encompassed in several brief sketches of different aspects of habitat and culture.

SPHERES OF CHANGE

HABITAT AND SUBSISTENCE

The basic Woodland pattern of small game hunting was overlain, in the Dakotas, by heavy reliance on bison. This reliance is directly attested to in the food bones found in their camps. It is further suggested by bison bone in some of their cemeteries, which offers the possibility that this dependence was on occasion ritualized by ceremonial offerings of bison to the dead. No significant part of the biome was neglected, however, and subsistence relied also on small game and food gathering. Indirect evidence for horticulture for some time consisted of rare bison scapula digging tools used as hoes by the historic groups, and by storage pits. Recent work at the Arp Site, south of Chamberlain, S.Dak., yielded burned corncobs as well as socketed scapula hoes in a Woodland site containing artifacts closely related to those of the Woodland component at the Scalp Creek Site in Gregory County, S.Dak. (Jelks, 1962, p. 71).

The culturally distinct and, presumably, not closely related later settled village people who occupied southeastern South Dakota by at least A.D. 700 elaborated this basic economy in at least one dimension: intensive horticulture was practiced on the basis of the direct evidence of corn, beans, and squash and on the indirect evidence of settled villages, large storage pits, and bone agricultural implements, all of which are paralleled in the historic, sedentary village horticultural peoples. The long history of agriculture in the Dakotas was posited long ago by agricultural studies of the historic Indian food plants and horticultural practices, all of which were carefully selected and well-adapted to the cold dry climate of the Dakotas (Will and Hyde, 1917, p. 290).

After his analysis of corn remains from Huff, Boley, and Deapolis, Cutler (Appendix 1) found that with the exception of a single popcorn from Huff, this corn was northern flint. The latter corn ranges from the Atlantic States to the Plains. The differences between the eastern flints and those in the Plains are considered to be the result of mixing with corn from the Southwest.

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We may well imagine that the first horticulturalists were less successful than their descendants, but the steady upriver movement along the Missouri postulated appears to have occurred slowly enough that gradual selection of the more hardy and productive varieties was accomplished over a long period of time. Data are not yet at hand to ascertain whether the corn of the settled village peoples consisted of the varieties they brought with them from further east or whether they may have adopted some of the varieties being grown by the precedent Woodland populations—either alternative is plausible.

There were doubtless minor and major shifts in the degree of dependence upon horticulture versus hunting, and even perhaps between different food animals, but bison provided the bulk of the meat diet of the village peoples. Data from the village sites reveal that more than 95 percent of the food bone in village refuse consists of bison bone. There is a remarkable tenacity of the basic pattern of mutual horticulture and hunting that intimates that this pattern, once established, was found to be well suited to the population density, land productivity and game resources, and the aboriginal level of technology. This assertion requires elaboration. The Mandan and their cultural predecessors have been in the Dakotas for at least a millennium, but the increasing data convey the distinct impression that there was no significant change in the subsistence base during this time. Unfortunately, this impression cannot be quantified on the basis of food remains; vegetal materials are rarely preserved unless they are charred, and the bone in villages directly reflects butchering techniques. An analysis of the bones in village sites in the Dakotas reveals at least two separate butchering techniques attributed to the Hidatsa and to the Mandan-Arikara, but which involve only minor variations in the patterns (Wood, 1962 a; and Appendix 2 of this report). The following data (from White, 1953, p. 163 for Monroe and Anderson; and Wood, 1962 a, for Paul Brave and Huff) suggest that there was no clear trend through time for utilization of the bison:

	Number of Houses	*Number of Bison*	*Ratio*
Monroe	4	59	14. 8
Anderson	7	36	5. 1
Paul Brave	3	53	17. 6
Huff	8	88	11. 0

The adaptation to the environment of the Dakotas appears to have been acquired early and endured without substantial modification. The vagaries of climate may have temporarily changed the relative emphasis on bison versus garden produce, but it is difficult to escape the conclusion that the subsistence base of the sedentary village

peoples was stabilized by the local environment, which has not been profoundly modified in the recent past.

Weakly's work with tree rings in Nebraska is taken to substantiate the recent stabilization of climate. The droughts in the Central Plains reveal an alternation of wet and dry periods over a long time period and "offer no evidence that climate has either changed greatly in the recent past or is now changing. In other words, drouths have occurred at more or less frequent intervals over the past 400 years" (Weakly, 1950, p. 92). He continues that "It is entirely possible and probable that during some of the protracted drouths of the past, the country closely approached an absolute desert character." The careful plotting of drought periods in the Central Plains is not yet matched by work in the Dakotas; however, Weakly, now beginning work in this area, informs me (personal communication) that the really severe droughts of considerable duration appear in both areas, although patterns and duration do not always agree.

It is possible that conditions were somewhat more favorable in the Dakotas where, as Will (1950, p. 96) asserts, the same amount of rainfall is subject to less evaporation. In addition, Lehmer (1954 b, p. 147) has reminded us that the Missouri River draws much of its flow from the Rocky Mountains, and would have been relatively unaffected by lowered precipitation in the Northern Plains. Utilization of the river bottoms by the Indians drew on natural subirrigation from the river, permitting crops even through a series of several dry years. Will (ibid.) observed that only three or four complete crop failures occurred in 50 years in the Dakotas.

The villages of the Three Tribes along the Missouri River were bordered by Plains short-grass lands (map 18). If the hypothesis can be substantiated that the predecessors of the Mandan are to be found in the western prairies of southeastern South Dakota in the Chamberlain Aspect, we are faced with

> . . . something special: agricultural prairie tribes who entered the plains but retained their prairie culture. The cause is not clear, but it was evidently not . . . wholly the lure of the bison. It may have been hostile pressure from downstream or to the east; or a mere experiment . . . [They] did not need extensive farm lands and planted in the bottoms, so that it mattered little to them whether the rest of their range lay in short or tall grass. [Kroeber, 1947, p. 83.]

In a real sense, the Three Tribes isolated themselves in a peripheral area "as an islet detached from its former habitat and cultural affiliations" (Kroeber, 1947, p. 85), inasmuch as the Missouri River valley is little more than a tongue of the Southern Hardwood Forest protruding into the Plains Grassland (Schantz and Zon, 1924).

The penetration of the Dakotas by both Caddoan and Siouan horticulturalists appears to have taken place in southeastern South

Dakota. The predecessors of the Mandan continued to move north along the Missouri River and its major tributaries to the maximum extent of aboriginal maize horticulture, this movement having been accomplished well before A.D. 1500. It has been inferred that the earliest village populations in southeastern South Dakota had established a subsistence base that was not profoundly modified until contact with Europeans brought far-reaching consequences not only in subsistence but in every other aspect of life.

INTERTRIBAL RELATIONS

The fact that some of the earliest Chamberlain Aspect sites in southeastern South Dakota are fortified provides an interesting lead to the relations with adjoining groups. The houses of this complex were commonly shielded behind a short ditch which isolated the village on the tip of a terrace spur. These defenses can best be interpreted as a reaction to a local hostile population, not as bulwarks against people from whom they had fled under pressure from, say, the east. That the local hostiles were not consistently aggressive is suggested by the sporadic occurrence of the fortifications.

The subsequent Thomas Riggs Focus populations may have been forced upstream to escape these depredations, for many of the Thomas Riggs Focus settlements downstream (including the Thomas Riggs Site itself) are fortified. If this view is correct, they appear to have been relatively successful. Among the excavated and reported sites in the north, only one is known to be fortified, the Tony Glas Site, and it is felt to be transitional between the Thomas Riggs and Huff Foci. The qualification "known" is necessary in the event that apparently "open" sites were fortified by means that did not include a ditch or other features which would leave telltale surface indications. There is a broad distribution of such apparently unfortified villages in the north, a circumstance which implies that it was unnecessary to group the villages for mutual protection.

The Tony Glas Site was enclosed by a rectangular ditch similar to that at the later Huff Site except that this ditch—like most of the other fortifications predating Huff—lacks bastions. It is at Huff that the fortification complex seems to reach its most complex expression, which can be interpreted as a renewal of hostilities at an even higher level of intensity than that exhibited by the Chamberlain Aspect Sites. At the same time, the Huff Focus represents a drastic contraction of the area occupied by the Thomas Riggs Focus. At the time this study was first formulated, the reduced territory occupied at the time of Huff was related to a period of climatic desiccation which postdated the Thomas Riggs villages (Wood, MS. c, pp. 80–81). The villages of the Thomas Riggs

Focus, as well as sites of the Chamberlain Aspect, are often blanketed by thick mantles of aeolian sand and silt, sometimes attaining depths of 3 feet or more. This sand and silt was lifted by the strong local winds from the flood plains of the Missouri River during low water stages when large tracts of dry sand and silt were exposed (Lobek, 1939, p. 389). The lack of a deep aeolian mantle at Huff and the more shallow deposits over later Mandan sites (Will, 1924 a, p. 342) suggested recency and that they postdated a period of extensive desiccation.

Correspondence with Donald J. Lehmer and Alan H. Coogan has exposed the fallacy of this position. Lehmer pointed out that there was no aeolian mantle at either the Dodd Site (39ST30) or the Fire Heart Site (32SI2). Furthermore, the aeolian deposits overlying sites seem to be rather sporadic in contrast to the situation in the central Nebraska Upper Republican sites covered by windblown sediments. Coogan (personal communication) has provided a number of statements, based on his work in the Big Bend area, which materially assist in the understanding of the uneven deposition of aeolian deposits on the river margins. Sites which can be expected to lack a good mantle will be those exposed to strong winds on the upwind side of the source of silt, the river. On the other hand, the mouths of creeks on the downwind side usually have a good silt cap on the older terraces, usually two to three times thicker than on the main terrace. Since, as Coogan says, this is probably due to lack of erosion by wind in the confined creek valley, it is also likely that terraces low enough to carry a tree cover—or which are sheltered behind trees—will similarly bear a thick mantle. Two of his conclusions are especially pertinent: (1) Thickness is not related directly to the length of time of deposition. Thicker silt caps are not "older" than thinner ones, nor did they take longer to accumulate. (2) No special processes or dramatic changes in climate are needed to account for these silt caps. Thus, the uneven deposition of aeolian deposits is a function of wind direction at the time the river bars are exposed, as well as the conformation of the valley floor with respect to the river channel. This digression should lay to rest any supposition that the silt mantles over the sites under discussion are the direct result of drought conditions.

The question of silt mantles aside, however, there are clues deriving from climatic studies in the Central Plains which lend support to the assertion that droughts did figure prominently in the prehistory of the Dakotas. Wedel (1959, p. 571) has suggested that the drought of A.D. 1439–1468 may have been the stimulus which led to the abandonment of the Central Plains by the Upper Republican people and their movement north into the Dakotas. Droughts of this

duration must have rendered the Central Plains a virtual desert, with heavy filling of canyons by windblown soils (Weakly, 1950, p. 93). If the dating of Huff at A.D. 1500 is at all accurate, the transition from Thomas Riggs to Huff was taking place during the time of this drought farther south which, from its length and severity, must have had important consequences even in the Dakotas. This line of thought leads to the very strong suspicion that the drought would have affected nomadic hunters no less than horticultural peoples, and that nomads, preying upon villages weakened through drought and loss of crops, may have forced a retreat into consolidated, fortified redoubts. I am not here espousing a "nomadic eruption" which washed over the village groups, but it seems obvious that any group which subsists on the prairie grasses—by way of the game animals it supports—will turn to the gardens of horticulturalists when these grasses are desiccated. Toynbee regards this as a "mechanical reaction" to forces beyond the nomads' control in his discussion and survey of the historic interventions of nomads against sedentary societies (1934, vol. 3, pp. 7–22).

There is, of course, an alternative explanation for the Huff Focus contraction into a smaller territorial unit, and this is the possibility of hostility between the terminal Thomas Riggs Focus and early Huff Focus settlements and downriver village groups. A growing number of Plains archeologists are inclined to accept the hypothesis that, about A.D. 1550, the Thomas Riggs and Huff Foci populations were competing for the Missouri Valley trench in the Northern Plains with derivatives of the Central Plains Tradition groups from Nebraska (Caldwell, 1964, pp. 2–3). As Caldwell states, "the exact situation is unclear but at the very least it must have been a time of trouble and tension." The large numbers of La Roche Focus and related villages in the southern Middle Missouri imply that their populations were great, and could have provided very formidable antagonists for the Thomas Riggs and Huff Foci peoples. The available surface collections and the excavations at present do not reveal any overlap in the distributions of the Huff and La Roche or culturally related sites, a circumstance which lends some support to the hypothesis of competition between these groups. Certainly, the two groups were in part contemporaneous and, at least in the villages on opposing territorial limits, were in contact. Such contact is seemingly demonstrated in the cultural inventory of the Demery component (39CO1), the northernmost of the sites in the La Roche "tradition" (Woolworth and Wood, 1964, pp. 128–135). It is obvious, however, that as the data accumulate a very careful reading of the evidence is necessary to determine precisely who was preying on whom, if this in fact can be determined from the archeological record.

In any event, the hostile stimuli which precipitated the removal of the Huff populations into large, consolidated villages continued unabated until the warring nomads were pacified by the American Government late in the 19th century. The identity of the Huff antagonists is unknown, but after about A.D. 1750 the raids on the Mandan villages were by the now-equestrian, nomadic Dakota, newly expelled under pressure of westward-moving Whites and Indians from the territory that is now the State of Minnesota. Some time after A.D. 1500 and before A.D. 1700 the Mandan settlements changed from large, ordered villages of long-rectangular houses to smaller, highly compact settlements of circular earth lodges.

The protohistoric and historic Mandan villages at the mouth of the Heart River were surrounded by curvilinear ditches, palisades and bastions, within which the houses were tightly clustered, leaving little more than enough room in which to carry on daily activities. The villages not only were notably larger after fortifications were reintroduced at the time of Tony Glas and Huff, but there was a much larger population residing within the village, which may have enabled the defenders to better maintain a proportionately smaller village perimeter against attack. Such measures were paramount, for these settlements were subject to such severe attack by the Dakota that the villages, which La Vérendrye regarded as impregnable, were destroyed and the occupants dispersed with heavy casualties (Will, 1924 a, pp. 306–307). As Bruner (1961, p. 210) remarked, the assailants were not playing the game of small-scale ambushes familiar from the literature. They were seriously intent on the annihilation of their victims, and the fortifications were accordingly designed for protection against direct, frontal, massive assault. In this struggle the diseases introduced by the Europeans were distinct factors contributing to the eventual near-eradication of the village peoples. Table 16 clearly reveals the increasing village population with respect to the actual volume of land occupied. In this tabulation, column 1 is based on estimates of the original size of the village. Column 3 is based on an estimate of 10 individuals per household, less 10 percent for the possibility that all houses were not occupied simultaneously.

The contraction in the area occupied by Thomas Riggs Focus settlements, which was still further constricted in the Huff Focus period, need not be interpreted as a reduction in population. As the area of occupation and the number of villages diminished, the size and population of settlements rose, and it was possible that population was not significantly reduced until the advent of European diseases and the arrival of the Dakota in the mid-18th century.

TABLE 16.—*Variation in village population and density*

	Number of houses	Acreage	House density per acre	Village population
Chamberlain Aspect:				
Mitchell	45	5.3	8.5	410
Brandon	37	4.7	7.9	330
Thomas Riggs Focus:				
Thomas Riggs	23	17.3	1.6	200
Havens	40	15	2.7	360
Paul Brave	14	4	3.5	125
Tony Glas	45	12	3.8	410
Huff Focus:				
Shermer	79	9	8.8	710
Huff	115	10	11.5	1,035
Heart River Focus:				
Larson	72	7	10.3	650
Double Ditch	163	12	13.6	1,470
On-a-Slant	64	6	10.7	575
Historic Mandan:				
Fort Clark	68	13	5.2	610

Relations between the Mandan and other groups of a very different nature are revealed in their trade relationships. Relations between the Mandan and other groups were structured largely by trade, and exchange with the very tribes with which they were at war was affected by a set of ceremonial mechanisms described by Bruner (1961, p. 201). After the proper ritual, even bitter enemies could trade safely within the Mandan villages:

> A father-son adoption ceremony was the key mechanism of social structure which enabled members of warring tribes to trade in peace. The Mandan were adopted by fictitious fathers, and in turn had adopted sons in the tribes with whom they dealt. Jablow (1951, p. 46) has distinguished two types of trade patterns: individual trade conducted by the women from house to house; and ceremonial tribal trade conducted by the men, in which large quantities of goods were exchanged between one tribe and another. Rituals of adoption were part of the latter. Plains Indian trade was accomplished by barter between fictitious relatives. From a larger perspective, a vast network of ritual kinship relationships extended throughout the entire Plains.

The Mandan were a vital part of this trade web in the North Dakota area, which appears to have been firmly rooted even before the introduction of the horse and of European trade. From the nomadic Crow, Flathead, Nez Percé, and Shoshoni, the Mandan acquired products of the chase in exhange for corn, passing goods along to the eastern nomadic Cree and Assiniboin (Ewers, 1954). Most of this trade was in perishables; but marine shells, such unique stone as catlinite, pottery, and European trade items are imperishable goods which are found in village sites and which can be traced to their source.

The *Dentalium* and *Olivella* from Huff came from the Pacific Northwest Coast, undoubtedly via western nomads corresponding to the historic Flathead and Nez Percé, who in turn derived these shells from aboriginal markets on the Columbia River near The Dalles,

Oreg. (Spier and Sapir, 1931, pp. 224–228). The finding of these two varieties of marine shell at Huff corroborates Ewers' contention that the historic horse trade routes simply elaborated earlier trade routes between the Mandan and adjoining tribes. Both varieties of shell are turning up in sites along the prehistoric trade routes. For example,

> Throughout the sequence [in Wilson Butte Cave in south-central Idaho] cultural relations appear to have been closest with the Plains area, but *Olivella* and *Dentalium* shell beads in the latest prehistoric deposit indicate trade relations with the distant Pacific Coast. [Borden, 1961, p. 582.]

The prehistoric and historic data together point up the fact that the village people in the Plains were in contact with each other and with the nomadic hunters over a large area, and that there was interaction from very early times. The late Northern Plains nomads are, in many respects, a people with no history—yet they appear to be critical to an understanding of the culture history of this area. Distant events had their impact in the Dakotas, as witness the fact that the Mandan had very good accounts of the Spanish as early as 1738 through intermediaries to the southwest (La Vérendrye, 1927, p. 336).

In addition to the western and southwestern contacts, North Dakota groups were getting catlinite from the pipestone quarries in what is now Minnesota as well as conch shell traded north through as yet unknown channels from the Gulf of Mexico. The presence of *Dentalium*, catlinite, and conch shell in some of the as yet unreported Woodland sites in the Dakotas demonstrates that this trade was well established even before the Mandan intrusion, hinting that the Mandan adopted or usurped their trade network from their predecessors.

This assumption carries with it the implication that the Woodland groups engaging in such trade were horticultural, at least in part. The recent discovery of corn in a Woodland site in South Dakota (Jelks, 1962, p. 71) strengthens this possibility; what more likely commodity than corn would have drawn the western nomads into trade with Woodland settlements? There would have been little economic gain for western nomadic hunters to have exchanged products of the chase with Woodland hunting groups. Furthermore, trade networks often alternate between hunters and horticulturalists, which enable "each group to supplement its own economy with the products of the other's labor" (Ewers, 1954, p. 433).

INTERNAL SOCIAL AND CEREMONIAL CHANGE

The picture emerging from the study of Thomas Riggs Focus components is one of a series of small settlements occupied by

about 15 to 40 households, loosely arranged in irregular rows along the Missouri River terraces, with the entrances consistently oriented to the southwest. During this period there is evidence of a village plaza, for at the Thomas Riggs Site the houses seem to be arranged in a crescentic pattern facing what may be a plaza at the village edge southwest of the houses (fig. 14). It seems hardly accidental that the entrance to the largest of the long-rectangular houses excavated at this site faced the approximate center of this open area. At the Tony Glas Site the houses envelop an open area approximately in the village center and, again, the entry to the very large House 2 faces the center of this space, which with some justification may be referred to as a plaza.

At Huff the houses are more regularly arranged in rows than in any of the Thomas Riggs Focus settlements, and the open plaza in the heart of the village is a conspicuous feature of the village plan (fig. 14). Here, too, the entrance to a long-rectangular dwelling larger than any of the remaining houses faces the southwest and the plaza center. The Heart River villages of circular lodges subsequent to Huff consistently have an open plaza at or near the village center, and there are ethnographic data to indicate that the now-circular but flat-fronted ceremonial lodge faced the south overlooking this plaza. There is considerable range in variation in the size of the Thomas Riggs and Huff long-rectangular houses, and the fact that one of them is very much larger than other excavated houses is, alone, insufficient reason to postulate it as the village ceremonial lodge. But at Thomas Riggs, Tony Glas, Huff, and the historic Mandan sites the fact that the largest known houses in the site faced south or southwest seems adequate reason for the identification of these prehistoric houses as ceremonial in the face of the ethnographic data. The Mandan folklore claims that the Okipa was introduced at the mouth of the White River, in South Dakota. This seems consistent with the archeological data, for the village plaza seems to have been an integral part of the Thomas Riggs Focus settlements, the location of which remained constant with respect to the position of the ceremonial lodge, although it was shifted from a spot adjacent to the village until, at the time of Huff, it was in the very center of the settlement. The form of the ceremonial lodge itself was changed after about A.D. 1500. As late as Huff it was a long-rectangular structure resembling the common dwelling type but of larger dimensions. In the historic sites at the Knife River it was a circular lodge distinguished by a flat front—a seeming retention of the front and entry of the older religious structure. Carryovers of older elements in such contexts are paralleled by the pit house becoming the kiva in the American Southwest. There is, in fact, a documented, historic example of precisely this sort of

carryover among the remnants of the Three Tribes themselves. At the time the circular earth lodge was abandoned in favor of White-style rectangular log houses on the Fort Berthold Reservation, circular "council houses" or "dance lodges" were made of logs (Densmore, 1923, pl. 3, *b*; Hartle, 1963).

Data relating to the sacred cedar, which was placed in the plaza center, is restricted to the historic sites and to ethnographic statements, but it is entirely possible that it was a part of this complex as early as Thomas Riggs. A very real effort should be made to locate this ceremonial feature in each of the sites of suspected Mandan affiliation, particularly since it is an element known only for this tribe and may be regarded as a diagnostic for Mandan villages.

The long-rectangular houses of both Thomas Riggs and Huff contain a primary fireplace offset toward the entrance and, commonly, a large auxiliary fireplace offset toward the side or rear wall, separated by the central roof support post. These multiple fireplaces suggest that these houses were occupied by extended families, each with its own hearth. The actual volume of living space within the house varies considerably in any given site, but a computation of the square feet of living space revealed no trend for either an increase or decrease in size from Thomas Riggs to Huff. Village density rose from about 1.6 houses per acre at Thomas Riggs to 3.8 per acre at the fortified Tony Glas Site, then to 11.5 at Huff, and ultimately to 13.6 at Double Ditch, but if the area of the house living space is any indication there was no radical change in the household composition.

Efforts to reach conclusions respecting village social and ceremonial organization beyond those already stated are frankly speculative, but it does not seem unreasonable to suggest that each of the Thomas Riggs Focus settlements was politically autonomous. They may well have been relatively isolated, perhaps at some distance from one another. The extreme geographic distribution of these closely related sites certainly lends support to such an assumption. There are, in addition, several hints in the ethnographic data to support a degree of isolation at one or another stage of Mandan development. Lowie's (1917, p. 8) conclusion that the Mandan clans developed in recent times from formerly distinct local groups (see p. 13–14) seems consistent with Bruner's conclusion (1961, p. 193) that the distinctive dialectual differences within Mandan noted by both Bowers (1950, p. 25) and Maximilian (1906, vol. 2, p. 259) must have either developed or been maintained at an early period. Bruner (1961, p. 204) advances the hypothesis that

> The elaborate ceremonial structure, clan organization, and age-graded society system, which were such colorful and important features of historic Mandan

culture, would not seem necessary as integrating mechanisms during [this] period because of the small size of the community and low level of political integration.

He continues:

The concentration of villages and higher population density called for more elaborate means of societal integration and social control (Eggan, 1952, p. 42; Wedel, 1956, p. 90), accomplished by the age-grade society system, clan organization, and such elaborate ceremonials as the Mandan Okipa, which has many features in common with the traditional Plains Sun Dance.

The shift from villages of 200 to 400 individuals of the Thomas Riggs Focus to the Huff population of nearly 1,000, combined with increased village density, certainly must have had an impact on the social system. The building of fortifications and their maintenance by the women, under the direction of the Black Mouth soldier society, must have simultaneously modified the procedure of village planning, the horticultural pursuits of the women, and perhaps even the strength and influence of the Black Mouth society itself. It is even possible that the Okipa ceremony itself was elaborated at the time of Huff. Bowers' (1950, pp. 111–163) description of this important ceremonial clearly reveals its function as an integrative device, which could surely be expected to elaborate under such stress as is indicated by the heavy Huff fortifications.

ALTERNATIVES AND DISPLACEMENT IN MATERIAL CULTURE

In addition to the transformations inferred in social and ceremonial life through both the influences of hostiles and neighbors who were at least intermittently friendly, Mandan material culture was substantially modified in two primary areas: domestic architecture and art.

Until about A.D. 1500 the architectural forms used both for dwellings and ceremonial lodges were long-rectangular structures which varied somewhat from site to site and persisted over a long period of time, but which changed only slightly with respect to the primary details of floor plan and, inferentially, roofing techniques. Changes between Thomas Riggs and Huff involve only minor details of the position and number of central support posts upon which the ridgepoles rested, and much the same sort of reconstruction of the superstructure would be imposed by the conditions present in houses of both complexes.

One structure at Huff signals the change from this long-rectangular house tradition to the circular earth lodge of historic times. This transition at Huff is marked by a four-post, subrectangular dwelling with wall posts closely spaced along each of the walls (fig. 14). The presence of this unique house type is attributed to contacts with groups to the south, in central South Dakota. The historic Plains circular earth lodge has been postulated to have derived from a square

four-post earth lodge of a form known from such complexes in the Central Plains as Upper Republican. Such square to circular transitions are documented in four widely separated sites, one of them an Upper Republican site in central Nebraska, Sweetwater (Champe, 1936), and a second in what the excavators and reporters feel to be a derivative of Upper Republican in South Dakota, at Arzberger (Strong, 1940; Spaulding, 1956). Two other sites, not distantly related to Arzberger and probably attributable to the Campbell Creek Focus, have yielded houses much like the four-post Huff house: these are Component D at the Talking Crow Site, and a component at the Black Partizan Site (C. S. Smith, personal communication; and Caldwell, 1960), both sites in south-central South Dakota. The prototypes and the transitional houses at each of these sites differ from the historic Plains earth lodge in one important respect: the walls are composed of closely set vertical posts, while the historic lodges have walls made up of widely spaced primary posts connected by stringers, and closed in with leaners resting against the stringers. The four-post, subrectangular house at Huff resembles these southern prototypes in the possession of closely set wall posts.

The derivation of the four-post house at Huff from such southern sites, felt to be of Caddoan affiliation, is strengthened by the presence of sherds at Huff of types found in the La Roche Focus, which is thought to be undifferentiated Pawnee-Arikara (Smith and Grange, 1958, p. 124), perhaps derived from Arzberger or a Campbell Creek Focus source. Four-post square or subrectangular houses are as yet unreported for La Roche Sites, but since trade pottery at Huff resembles La Roche pottery more than it does Arzberger or Campbell Creek, this circumstance prompts the speculation that the shift from square to circular houses had not been wholly completed by the time La Roche had differentiated, at least ceramically, from its parent stock. In any event, present data suggest that the four-post house type at Huff finds its clearest parallels, and almost certainly its prototype, in central South Dakota sites under strong suspicion of Caddoan authorship. The A.D. 1500 date suggested for Arzberger by Spaulding, and corroborated by Carbon-14 dates, and the estimated dates of A.D. 1550 to 1650 for the Chouteau Aspect (Spaulding, 1956, p. 110; Smith and Grange, 1958, p. 124) are near enough the tree-ring cutting dates for Huff of A.D. 1485–1543 to permit the contacts between central South Dakota and Huff necessary for the transmission of the house type into the Mandan sequence.

Unfortunately, there are no earth lodge floor plans of either Mandan dwellings or ceremonial lodges reported between the time of the occu-

pation of Huff and Like-a-Fishhook Village—a period of about 350 years. Schematic drawings are, however, available for the historic dwellings (Bowers, 1950, fig. 14). Little can be said regarding architectural changes during this period except that the houses of the Heart River area dating around the mid-1700's appear to be consistently circular, the shift from the Huff long-rectangular houses to the historic circular form having taken place by about A.D. 1600. On the ethnographic level, only the slab-lined fireplaces of the Mandan earth lodges distinguish them from the Hidatsa and Arikara lodges.

Changes in community plan and architectural forms may be detected by the most superficial examination of the surface features at these sites, but it is necessary to turn to the results of more detailed examinations of the artifacts from excavations to reveal changes in other spheres of life. Except for pottery, the gross inventories of artifacts from the majority of Plains village groups manifest a striking homogeneity during the Coalescent period, with only a few traits appearing to have temporal significance or which are characteristic of particular groups. The most rewarding comparisons are those of the decorations on tools and ornaments, particularly those on pottery rims and shoulders. In virtually every class of artifacts there are a few items made either with a degree of perfection not required by its function, or embellished with, usually, incised decorations. Occasional projectile points of excellent finish are present in all the sites. Grooved, ridged, and highly polished stone axes occur in both the Chamberlain Aspect and in Thomas Riggs, the degree of finish far exceeding that necessary for utilitarian purposes. Bone tools are commonly embellished, as witness the incised bone tubes and awls of sites from the Chamberlain Aspect through Huff. Anthropomorphic figures on two of the Huff arrowshaft wrenches are unique, and the swan-headed bone batons at Double Ditch do not occur in earlier sites. There are a number of plain and incised mollusk shell thunderbird effigies at Tony Glas, but only one fragment of a plain specimen at Huff. By and large, however, such artifacts are too rarely found to provide data of any completeness for historical studies, and many more sites will have to be studied to acquire enough data to compensate for the small samples from these partially excavated villages.

Pottery making was a major activity of the women in every household. Mandan pottery was well made and reasonably hard, but the large numbers of sherds in their sites suggest that vessels had no great longevity. Vessel rims were virtually all decorated in one way or another, but shoulders were less often embellished.

Rim designs in the Chamberlain Aspect were incised or cord impressed with horizontal lines interrupted by closely spaced erect

triangles, with rare crosshatching and continuous chevrons. In Thomas Riggs components, embellishment on the collared rims consists of either continuous, uninterruped horizontal cord-impressions or horizontal cord impressions interrupted by four equally spaced cord-impressed erect triangles capped by lip nodes. At Huff the majority of embellished S-shaped rims follows this identical pattern. The crosshatched rims, present in varying number in Thomas Riggs components, but consistently rare, are lacking in Huff and later sites. New elements characterize the Huff ceramics: the Stanley Tool Impressed and Stanley Plain vessels at this site continue into sites as late as Double Ditch. The S-shaped rims at Double Ditch are impressed with finer, more closely spaced cords and a multitude of minor elaborations, but all essential elements are anticipated in the Huff sample (fig. 15).

Shoulder patterns constitute a series of discrete patterns which hitherto were unexploited, for the most part, in the Dakotas. The following comments derive from a recent study of such designs and their historical application (Wood, 1962 b). Two general patterns are detected in the relevant sites:

1. Shoulders covered with closely spaced horizontally incised lines with irregularly placed oblique or vertical incisions and "drooping cornstalk" elements.
2. Shoulders decorated with abstract geometric patterns consisting of alternating largely rectilinear elements.

The first pattern type with the solid horizontally incised field spans the Chamberlain Aspect and the Thomas Riggs Focus, but has vanished at Huff and does not reappear. The variations within the second pattern type are more subtle and must be examined more closely. They are executed in two ways. In the Chamberlain Aspect the dominant technique is "broad trailing," the lines made with a blunt tool leaving a broad, U-shaped trough. This technique declines in Thomas Riggs and Huff with the ascendancy of incising with a sharp instrument which left narrow, V-shaped lines. This latter technique persisted until the decline of pottery making.

Chamberlain Aspect shoulders bear continuous bands of connected chevrons or chevrons alternating with punctates and crosses as well as with concentric circles. In Thomas Riggs sites upward-pointing chevrons typically alternate with the "bear foot" element in an AB AB AB AB succession, dividing the vessel into quadrants. Curvilinear elements, including concentric circles, are quite rare. At Huff, the chevrons persist, but the alternating element, the "bear foot," is more elaborate, and the same succession of elements is followed. Another abstract geometric pattern, consisting of alternately upward-pointing and downward-pointing chevrons is introduced with the same succession. At Double Ditch, the opposed, nested

chevrons persist, but two new patterns dominate. One of these consists of vertical columns composed of a variety of oblique and vertical elements. The second, at once new to Double Ditch and the dominant pattern in downriver sites, is the "alternating triangle" pattern, which is characteristic of complexes of suspected Caddoan affiliation including the Nebraska Aspect, the Arzberger Site, the La Roche and related Foci, and historic Pawnee and Arikara villages, among others (fig. 15, *w'*). Patterns of all categories at Double Ditch and On-a-Slant are far more elaborate than those of the preceding complexes, representing, in this sequence, the climax of ceramic embellishment in the Northern Plains.

Although the impact of the Europeans was to have the greatest and the most devastating effect on Mandan material culture, from the time the first European goods were introduced until about A.D. 1750, the actual changes in Mandan material culture were negligible. As Bruner (1961) observed, "Manufactured goods, such as the gun and metal objects, were simply alternatives, not replacements for the bow and arrow, pottery, and tools of stone, bone and wood." It was not until the Mandan settled in Like-a-Fishhook Village that the displacement of native-made goods by White-made goods was accelerated until native items became heirlooms (p. 142). This transition came when the Mandan lost their independence through two interrelated factors: the diminution of their population and the constant harassment by the Dakota, and their turn to the Indian agents and traders for their very existence.

PATTERNS OF CHANGE

Culture change in the Mandan sequence has been inferred from modifications in habitat and distribution and details of community patterning, and has been observed in the displacement of certain classes of artifact attributes, although changes of the former category rest on far less substantial grounds than those of the latter category.

Changes in social and ceremonial life have been deduced by speculative interpretations of the broad distribution of the small settlements of the Thomas Riggs Focus, as opposed to the restricted distribution of the large, heavily fortified and compact Huff Site and subsequent historic sites. This sequence of events is posited to have derived from the incorporation of isolated, politically autonomous villages into still autonomous but larger aggregates, in which the need for integrating mechanisms may have led to elaborations in the ceremonial structure, clan organization, and age-grade societies such as the Black Mouth soldier society.

Settlements and material inventories of the Thomas Riggs Focus were very similar throughout their distribution, and no convincing

instances can be cited of borrowing or extensive contact with neighbors except the presence of the *Dentalium* at the Thomas Riggs Focus site (39AR201) in South Dakota (Stephenson, 1961, p. 461). It is at the Huff Site, now under heavy assault by outsiders, that novelties begin to appear and Mandan culture begins to assume its historic expression. The incorporation of the small villages into such large, fortified redoubts as Huff has been posited as the result of weakening of the small village groups by drought, combined with increasing depredations by nomads and, perhaps, competing downriver village groups, affected by the same climatic factors.

The presence at Huff, as well as in earlier sites, of *Dentalium* points up the fact that relations were maintained with nomadic tribes far to the west. The Mandan, even as early as Thomas Riggs, were probably trading within the same sort of network as that reported by Ewers for the period of La Vérendrye and Lewis and Clark, the genesis of which may be as early as the Woodland period sites in which *Dentalium* occurs (Stephenson, 1961, pp. 460–461). The trade with these nomads, almost exclusively conducted in perishables, left its evidence in the Huff *Dentalium* and *Olivella*, and perhaps also in such elements reported in the historic literature as sinew-backed bows. When the nomads came to the Mandan villages to trade they must have brought with them only such items as were necessary en route, such as weapons, food preparation implements, and garments, most of which were much the same as their Mandan counterparts (see also Lehmer, 1954 b, p. 154).

The Mandan model for change was based, so far as the archeological data are concerned, on the Arikara. At Huff the Mandan had accepted a new house type which the Arikara themselves had not yet fully developed. The evidence for Arikara prototypes in pottery rim treatment, such as braced rims, is evident at Huff, and in the later Heart River Focus sites they have adopted the distinctively Arikara "alternating triangle" shoulder pattern (fig. 15, *w'*). The reasons for adopting a new house type, when the form they were using had been stabilized by nearly eight centuries of use, may be those stated by Howard (1962 a, p. 16), who feels that it was ". . . probably one of a number of important ecological adaptations which took place . . . as a result of the shift from a Woodland to a Prairie environment." The earth-covered earth lodge was, in all probability, warmer than the long-rectangular houses, if the reconstruction inferred from their floor plans is correct (pp. 102–104; fig. 13) in that the house ends and perhaps roof were bark or mat covered, and only the sides banked with earth.

Ample opportunity for viewing Arikara implements in use and even during manufacture would be afforded by the mutual exchanges between the Mandan and Arikara recorded from the historic horizon.

As Barnett (1953, pp. 375–377) observed, artifacts are more readily comprehended than ideas, and their relative merits are more easily detected, for they can be treated impersonally. Furthermore, their adoption does not require group consent. The Mandan were receptive to change in both ideas and in objects, and this is attested to by a number of observations which underscore their intellectual curiosity and willingness to accept something new. Maximilian, for instance (1906, vol. 2, p. 288), states that "Many of them dispute, with great earnestness . . . our ideas of the various heavenly bodies, and of the origin of the universe."

While some of them laughed outright when he affirmed that the earth was round, and revolved around the sun, others accepted this view. The linguistic abilities of the Mandan in learning the languages of their neighbors were attested by the early travelers, a circumstance no doubt prompted by their role as middlemen in the trade network. The data are less precise in the area of social institutions, but Lowie (1913; 1917) feels that the evidence is convincing that the Mandan and Hidatsa actively adopted one another's age-grade societies and ceremonials, as well as drawing on Arikara societies.

The impression grows that the Mandan, once they abandoned their isolated, autonomous villages for the more cosmopolitan, compact, and larger villages, were faced with a greater variety of alternatives through more extended contact with outsiders, however hostile. Their "contact community" was immeasurably increased. There was a relatively free exchange of social and material items with both the related Hidatsa and the adjacent Arikara. The generalization that they may have drawn upon the Hidatsa for ideational novelties, and upon the Arikara more heavily for material novelties is tempting, but its verification must await the reporting of a sequence for the Hidatsa. After the intrusion of Europeans and the decimation of the tribe by smallpox and the equestrian Dakota, the choice of models was no longer a free one: they were acculturated under American Governmental policies which recognized few of their old values and which effectively destroyed their ethos.

The Mandan sequence is not yet complete, but many of the general trends are now emerging in sharper relief. Many of the more prominent changes have been discussed in some detail, a review of which creates the impression of a slowly changing cultural continuum in which internal drift is increasingly abetted by the acceptance of novelties from outside sources. This process ultimately terminated in the deterioration of the pattern under European impact, which differed both in nature and scope from aboriginal contacts. It may perhaps be best descriptively synthesized as a "Direct Tradition," which is characterized "by an essentially unchanging continuity.

Those changes which take place do not effectively shift lines of development within the tradition" (Wauchope, 1956, pp. 42–45). I do not feel that the material novelties accepted by the Mandan altered the momentum of internal change so much as they displaced alternatives in what might be termed a "Direct, Displacing Tradition." Another term, the "Branch," has been borrowed by Lehmer (1954 a, p. 117) from the Southwest and applied to a local sequence in the vicinity of Pierre, S. Dak. This term seems to denote, in its major features, a locally restricted Direct Tradition, and both concepts seem applicable as descriptive syntheses of the Mandan sequence as it is comprehended here.

RECAPITULATION AND CONCLUSIONS

This study has been an endeavor to isolate some of the critical factors which shaped Mandan culture history. As such, it has been necessary to collate the prior syntheses of Mandan prehistory with the rapidly accumulating data resulting from post-World War II Inter-Agency Archeological Salvage programs along the Missouri River in the Dakotas. If it is true that "facts do not speak for themselves. They must always be cross-examined," (Kluckhohn and Leighton, 1962, p. 27) it is more than obvious that working hypotheses advanced to provide frames of reference for research must be constantly revised and appraised as work continues. The syntheses of Will and Hecker and of Bowers, based on initial impressions and on limited fieldwork, were found to be perceptive and sensitive indices to the chronology, periods, and rate of change in Mandan culture history. The increase in the available data has required only slight refinements and modifications of these pioneer efforts. As a result, a cultural sequence has emerged which seems essentially sound, but which will require elaboration and change as work progresses.

The hypothesis that Mandan culture is the result of trade and contact with representatives of village groups deriving from the Central Plains and with adjacent pedestrian nomads must be considered in view of the interpretation of Mandan prehistory advanced here.

The Mandan are a Siouan-speaking, horticultural village group which moved into the Great Plains from the Eastern Woodlands. Archeological and botanical data, consistent with the Mandan origin traditions, support eastern derivation. Furthermore, linguistic evidence suggests that they are a western extension of eastern linguistic groups, and separated from Proto-Siouan at an early date. Although the reason for this northwesterly migration is unknown, it extended over a period of time sufficient that their derivation is only subject to the suspicion of a syncretism of Mississippian and Woodland elements of unknown quantity. Their movement into south-

eastern South Dakota is reflected in sites of the Chamberlain Aspect. At approximately the same time, the Central Plains were occupied by Upper Republican people, and there was limited contact between these two broad areal traditions.

Communities of the Thomas Riggs Focus are the earliest manifestations which can be attributed to the Mandan with any degree of assurance. This complex is postulated to derive from a syncretism of the Chamberlain Aspect with other groups, although transitional sites are still lacking. The cultural sequence which associates the Thomas Riggs Focus with the historic Mandan is:

Thomas Riggs Focus	A.D. 1100–1400
Huff Focus	A.D. 1400–1600
Heart River Focus	A.D. 1600–1797
Historic Mandan	A.D. 1797–1886

The small settlements of the first complex represent widely spaced, probably largely isolated and autonomous villages, a circumstance lending credence to the linguistic and ethnographic clues that the Mandan developed from formerly distinct local groups. This complex is not suspected of having had extensive contacts with other groups, for there is only one item of nonlocal material in their settlements indicative of extensive trade; *Dentalium* is present in one village site. While there is a heavy complement of Mandan elements as early as Thomas Riggs, the basic structure of the historic Mandan does not begin to emerge until about A.D. 1500.

By this time the lightly integrated Thomas Riggs Focus villagers had abandoned their peripheral villages and formed a coalition consisting of the large fortified sites of the Huff Focus, with the Heart River as the midpoint of their distribution. Climatic desiccation and out-group aggression were advanced as factors in precipitating this contraction and merger. Two significant changes are postulated to have occurred in the internal and external social relations of these large villages.

(*1*) *Internal relations.*—The coalition of the small village groups in the heavily fortified, populous Huff settlements must have necessitated more elaborate means of social control and integration. The fortifications are direct evidence for aggression by outside groups, and it is reasonable to suppose that this show of force was met by an increase in group solidarity. In the historic Mandan, such solidarity was largely expressed by the Okipa ceremony, for which each village reserved an open plaza and maintained a ceremonial lodge. The village plaza-ceremonial lodge complex existed in the Thomas Riggs Sites, but it was progressively moved from a position adjacent to the village until, at Huff, it stood in the very heart of the settlement. The intimate association of this complex with the ceremony prompts

the speculation that this shift in locale may correspond to an increased importance of this ceremony in the maintenance of group solidarity. In sum, there is every reason to believe that tensions arising from both the unaccustomed coalition of formerly scattered groups and the enforced association for protection against hostile groups were met with the elaboration of existing social mechanisms to insure the perpetuation of the group.

(*2*) *External relations.*—At the very time when the Mandan were drawing together against hostile forces there is direct evidence for their increasing participation in a widespread trade network. *Dentalium* and *Olivella* from Huff and earlier sites is evidence that the Mandan engaged in trade relations of a sort which, in historic times, extended from the Pacific Northwest Coast to the Great Lakes and into the Southwest. This trade brought the Mandan into contact with both eastern and western pedestrian nomads, as well as with village groups living south of them along the Missouri River. The latter people are believed to have been undifferentiated Pawnee-Arikara, who abandoned the Central Plains under the pressure of severe droughts and moved north into central South Dakota. Contact between Huff and these village groups is demonstrated in the distinctively alien domestic architecture and trade sherds at Huff, and in pottery in the Mandan tradition from such sites as Arzberger in South Dakota.

The trade relations of the Mandan with other groups were structured by a network of ritual kinship relationships which enabled them to trade even with their enemies. Although the antagonists of the Huff settlements are uncertain, it is suspected that pedestrian nomads were in part responsible for the coalition of the Mandan villages and for the subsequent internal relations detailed above. Trade with these nomads involved essentially perishable goods, or at least goods shared by both the Mandan and the nomads, for, except for the Pacific Coast marine shells, there is no significant accretion in material culture which can be directly attributed to the nomads.

Trade with village groups living down the Missouri River provided the model for the observed changes in Mandan material culture. The Mandan at Huff were adopting a subrectangular four-post house which ultimately displaced their older architectural form except in ceremonial contexts, and they also adopted a number of ceramic novelities from the same source. Although there is evidence that these downriver populations may have been competing with the Mandan for the Missouri River trench, from the time of Huff to the reservation period, contacts with the Arikara, as well as with the Hidatsa, continued to mount and there is increasing evidence of borrowing from these groups.

So far as archeological data can illuminate the processes, the dual nature of the contacts between the Mandan and their neighbors at about A.D. 1500 seems to have elicited two responses: (1) The nomads and, perhaps, downriver competition from other village groups were responsible for the coalition of the Mandan into compact, fortified villages; for more elaborate expressions of Mandan solidarity; and for an intensification of mechanisms for social control. (2) The contacts with downriver village groups provided new alternatives for a number of Mandan traits, many of which were adopted and subsequently displaced the Mandan equivalents. The major facets of historic Mandan culture, then, are felt to have emerged as a result of two separate but contemporaneous factors: cultural cohesion deriving from nomadic and sedentary village aggression, and acculturation traced to adjacent village populations. These two forces shaped the formerly scattered Mandan villages into the tribe known to history, the consolidation of which apparently predates the arrival of the nomadic Dakota from the east. It is quite possible that the defensive measures adopted earlier, and later elaborated, is a major reason why the Mandan survived the years of intensive aggression at the hands of the equestrian Dakota.

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APPENDIX 1. CORN AND SQUASH FROM SIX SITES IN NORTH AND SOUTH DAKOTA [1]

By Hugh C. Cutler

Missouri Botanical Garden and Washington University

Corn.—Most of the corn from Huff and the five other nearby sites in North and South Dakota belongs to the race called Northern Flint (Anderson and Cutler, 1942; Brown and Anderson, 1947) or Eastern Flint, because it is found in the Eastern United States from the Gulf of Mexico through New England and in southeastern Canada. The eastern forms of this race have extremely hard cobs with rather wide cupules, usually measuring 8 to 10 or even 13 mm.; they usually have 8 rows of grains, occasionally 10 rows, and very rarely 12 rows. When there are 12 rows of grains there is ordinarily some evidence of hybridization with other kinds of corn, often a small-grained popcorn. The plants of Northern Flint are relatively low, and branch or sucker greatly at the base; each plant bears two or more ears. Usually the second ear is smaller and somewhat later, and if more ears are borne they are very small and in many instances are not pollinated or do not mature. Ears borne on suckers are smaller than those borne on the main stem.

West of the Mississippi, plants of the Northern Flint race are commonly shorter, and usually the ears are smaller and have more rows of grains. The cobs are softer and smaller, and in many instances the cupules are about 7 mm. in width. (A cupule is a hollow in the cob associated with a pair of grains. It is used here as an index of cob size.) There are larger numbers of imperfect ears. The increase in the number of rows of grains in Plains corn is a result of mixing it with other kinds of corn from the Southwest as well as with popcorn. Will and Hyde (1917) picture selected ears of Plains corn that are somewhat larger than the average ears. Even these selected ears are shorter than the average ears of good New England or New York forms of Northern Flint.

The colors of the original corn cannot be identified from the carbonized cob fragments submitted, but it is likely that they were the same as in ears pictured by Will and Hyde (1917). To judge from descriptions in early travelers' accounts, and from the samples and

[1] The respective sites and the collectors are: Paul Brave—A. R. Woolworth and W. R. Wood, 1955; Huff—J. H. Howard, 1959, and W. R. Wood, 1960; Demery—Woolworth and Wood, 1956; Sperry—R. S. Thompson, 1961; Boley—M. P. Mosbrucker, 1954-55; and Deapolis—R. S. Thompson, 1960.

notes in the Missouri Botanical Garden's collection (some of which dates back to the early 1900's), the most common color was a light yellow, with white being second in abundance.

The several collections of popcorn present can be identified readily by their larger number of rows of grains, smaller cupules, and smaller grains (fig. 16). The popcorn analyzed was probably the same kind still grown in the Plains by several tribes, including the Mandan, in historic times, and by some farmers in the area even today. Will and Hyde (1917, p. 307) describe Pawnee popcorn as "like Queen's

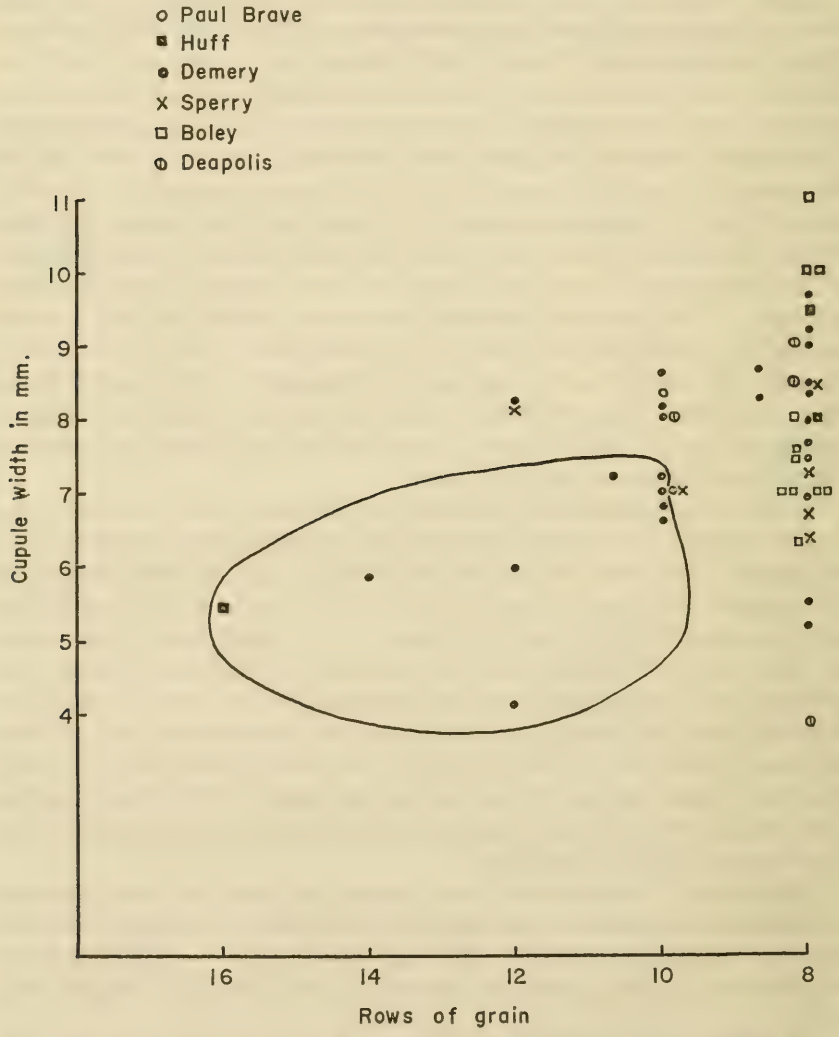

FIGURE 16.—Diagram showing the number of grains and cupule width of cob fragments from six North and South Dakota sites.

Golden," a variety still listed in many seed catalogs a few years ago. Popcorn similar to this has been found in some sites farther south and in the Southwest, and it appears to be an older kind of corn than Northern Flint. It may have come into the Plains before Northern Flint was introduced, but we still do not have sufficient material to work out an accurate history of Plains agriculture.

Squash.—The only species of squash cultivated in the Plains area before Europeans arrived was *Cucurbita pepo*, and several varieties are known from early descriptions and from archeological material. The most common cultivar (or horticultural variety) from the Northern Plains is called Mandan. This is a small green and cream color striped pumpkin with rather broad and blunt seeds. Summer squashes, field pumpkins, and yellow-flower ornamental gourds were also grown; but it is difficult to distinguish all of these by their seeds alone. The history of cultivated cucurbits in the Americas has recently been summarized by Cutler and Whitaker (1961).

PAUL BRAVE SITE (32SI4)

The two cob fragments from Paul Brave belong to the Plains form of Northern Flint. The lower glumes are slightly thinner than usual, but the ears may have been somewhat immature.

	Feature 15 (*cat. 1493*)	*Feature 46* (*cat. 1606*)
Rows of grains (number)	10	10
Kernel thickness (mm.)	3.2	4.0
Cupule width (mm.)	7	9

Five medium-sized corn kernels (cat. 1495, Feature 15) are typical Plains Northern Flint and may be either flint or flour corn.

A single carbonized and distorted seed of *Cucurbita pepo* (cat. 1494, Feature 15) apparently belongs to the cultivar known as Mandan, pictured in Will and Hyde (1917), for the seed is relatively broad. No reliable measurement of width could be made, but the seed is approximately 14 mm. long.

HUFF SITE (32MO11)

The Huff corn all came from Feature 102, a pit behind House 6. There is one charred cob fragment 27 mm. long, with the lower glumes broken but the cupules intact; it has eight rows of grain, and the kernel thickness is calculated from cupule lengths as 3.1 mm.; the cupule width is 8 mm. at the butt end of the fragment to 7 mm. at the tip end. This is typical Northern Flint.

One kernel was so expanded by heat that measurements are estimates of original size. It is 9.5 mm. wide, 6 mm. high, with a

thickness of about 3.3 mm.; it is crescent-shaped and is from 8-rowed Northern Flint.

Another kernel, expanded by heat and slightly damaged, is probably from a 12-rowed ear or is a tip kernel from an ear with fewer rows of grains. The width is 6 mm.; height, 6.2 mm.; and thickness, 3 mm. (all estimated).

James H. Howard sent a single carbonized cob to the Missouri Botanical Garden from his 1959 work at Huff. The cob is from a 16- or 18-rowed corn with rather small kernels (kernel thickness 3.2 mm.) and small cob cupule size (cupule width 5.5 mm.). The corn was probably a rather hard popcorn, not greatly different from the popcorns which the Mandan and Pawnee are reported to have grown.

DEMERY SITE (39CO1)

The sample from Demery, although large, is probably not typical of Mandan corn of the period. About one-quarter of the sample, an unusually large amount, consists of popcorn and, perhaps, sweet corn, which can be distinguished by their smaller cobs (as measured by cupule width in fig. 16) and higher row numbers. About one-fifth of all the cobs measured are charted in figure 16, and the eight cobs in the lower left of the diagram are probably popcorn or sweet corn. This is a high proportion because popcorn and sweet corn together probably amounted to less than 3 percent of the corn harvested by Plains Indians. The rest is typical Northern Flint of the Plains and resembles that from collections from many other Plains sites and from historic Indians of the region.

There is a small section of braided cornhusks from Feature 65. Early travelers in the West mention corn as being sold or stored in braided strands. Storage of corn in braids suggests a fixed village, occupied for a long period. Corn can be packed in a smaller space if it is not braided. A survey of the methods of storing corn should be made; even casual observation of the habits of living Indians shows that practices vary greatly.

There are 11 medium-sized flour or flint kernels from Feature 67, somewhat crescent-shaped as is usual for kernels of Northern Flint. There are also two small popcorn or hard flint kernels from 12-to 14-rowed ears from the same feature.

A single charred seed of *Cucurbita pepo* from Feature 65 is too distorted to be certain of measurements or of kind, but there are three well-preserved peduncles of this species. Two of the latter come from medium-sized pumpkins or squashes, and the third is from either a very small summer squash or one of the small ornamental *pepo* gourds.

Half of a seed of the common bean (*Phaseolus vulgaris*), measuring 5.6×9 mm., was found in Feature 67. This fragment is similar to others which have been found in sites in the Plains.

Three grape seeds and a juniper seed were also recovered in Feature 67.

SPERRY SITE (32BL4)

All of the six carbonized cob fragments from Sperry belong to the Northern Flint race, but the single 12-rowed fragment may be the result of hybridization with some Southwestern race of corn. Ears which result from hybridization with Mandan popcorn or sweet corn, both of which may have 12 or more rows of grains, usually have somewhat smaller cupules. The sample is not large enough for a thorough analysis. Three of the cobs fall in the lower range for cob size and may be ears from tillers, second ears on a stalk, or slightly immature ears. Measurements are as follow.

Rows of grains (number)	8	8	8	8	10	12
Kernel thickness (mm.)	3.5	2.9	3.3	3.5	3.8	4.2
Cupule width (mm.)	6.6	6.3	7.4	8.4	7.0	8.1

BOLEY SITE (32MO37)

All of the corn from Boley is carbonized and in good condition. Part of the corn is from a depth of 6 feet in a midden:

Rows of grains (number)	8	8	8	8
Kernel thickness (mm.)	4.0	3.3	3.6–4	3.3
Cupule width (mm.)	10–9	10–9	11	10

The lower glumes ranged from firm to medium fine. One tip fragment could not be measured, but apparently came from an incompletely pollinated ear. Corn from a depth of 5 feet in the midden measures:

Rows of grains (number)	8	8	8	8	8	8	8	8	10
Kernel thickness (mm.)	3.4	4	3	3.4	3	3.4	2.5	3.1	3.2
Cupule width (mm.)	7	10	7	7	8	7	6.4	7.4	7.5

Twenty seeds, not carbonized, are from squash (*Cucurbita pepo*) and represent at least two fruits: (1) One is probably a summer squash or a small pumpkin. (2) The other is probaly the cultivar Mandan. The seeds vary from 11×7.5 mm. to 14×9 mm.

DEAPOLIS SITE (32ME5)

There are four carbonized Northern Flint cob fragments from Deapolis, the fourth of which is probably a fragment from the same cob as the third:

Rows of grains (number)	8	8	10	10
Kernel thickness (mm.)	3	3.4	3.6	-----
Cupule width (mm.)	9	8.5	8	-----

There are crescent-shaped, carbonized, and distorted kernels from 8-rowed ears, also of the Northern Flint race. A single dried cob fragment has 8 rows of grains; the kernel thickness is 3.8 mm. and the cupule width 10.3 mm.

One wild plum seed was included in the sample of material. Nineteen seeds of squash (*Cucurbita pepo*) are from at least two fruits: (1) One is probably a small field pumpkin; seeds from this cultivar are about 15×8.5 mm. in size. (2) The other is probably the cultivar Mandan illustrated in Will and Hyde (1917). Seeds from this cultivar are very broad and blunt and have been identified from a number of sites in the Plains (Cutler and Whitaker, 1961). Typical measurements of Deapolis seeds are 10–13×7.5–8.3 mm.

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APPENDIX 2. NOTES ON THE BISON BONE FROM THE PAUL BRAVE, HUFF, AND DEMERY SITES (OAHE RESERVOIR) [1]

By W. Raymond Wood

These data and comments are based on the identification of the bison bone recovered in three village sites in North and South Dakota. The Paul Brave Site (32SI4), the Demery Site (39CO1), and the Huff Site (32MO11) were excavated by parties from the State Historical Society of North Dakota in 1955, 1956, and 1960. The Paul Brave and Demery Sites were excavated by parties directed by Alan R. Woolworth and myself, and Huff was dug by a party under my direction. Work in these villages, which are to be inundated or destroyed by wave action of the water retained by the Oahe Reservoir on the Missouri River, was carried out under cooperative agreements between the Historical Society and the National Park Service. The laboratory analysis of the bone was made at the University of Oregon in 1961 in the course of an interpretation of Mandan culture history underwritten by National Science Foundation grant. G-12970.

The total number of animals represented in the collections from Paul Brave, Huff, and Demery is given in table 1. This table was prepared on the basis of the criteria used by White (1953, 1954, 1955) in his analysis of bone from other Northern Plains sites. These figures include both worked and unworked bone. Totals were determined by separating the most abundant element of the species into right and left components, and using the greater number as the unit of calculation. Brief comments follow on the butchering techniques. As far as it was possible to determine, the method of dismembering the carcass parallels the descriptions offered by White (1953, p. 163) and Kehoe (1960, p. 422). Such comments as are offered here are essentially designed to supplement the data in table 1.

Skull and mandible.—In each of the sites the frequency of skull parts is low with respect to the greatest number of individuals represented. Complete skulls were rare, only one occurring at Huff and one at Paul Brave. Mandibles were the more common element, although none was complete. Most of them were broken between the incisors and cheek teeth, perhaps to extract the tongue. Nasal

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[1] Reprinted, with slight revisions, from the Plains Anthropologist, vol. 7, No. 17, pp. 201–204. Used with permission.

bones were common, and most of them were separated, perhaps from boiling to make soup. "Snout soup" was a rich consommé.

Vertebrae.—The atlas is less common than the axis, but fewer atlases were broken. Most of the axes were identified by the presence of the anterior articulating surface, suggesting that the skull was severed through this bone. All elements of the spine are rare by comparison with these two elements, and most of them must have been left at the kill site.

Scapula.—In each of the three sites the scapula is the most common element, representing 100 percent of the greatest number. The inference drawn by White (1954, p. 258) for this fact is that not enough bison were killed near the village to provide scapula hoes or bull boat paddles, so additional scapulae were brought from more distant kill sites. At Paul Brave, left and right scapulae were used without any significant preference: 53 rights, 50 lefts. At Huff, right scapulae were preferred: 88 rights, 67 lefts. The same preference is seen in Demery: 95 rights, 66 lefts. No ready explanation for this preference is apparent.

Forelimb.—Greater differences between the sites are apparent in the bones of the forelimb. The occupants of Huff returned the least number of elements from this part of the bison; Paul Brave, nearly twice as many as Huff, and Demery, nearly three times as many as Huff. It is interesting to note that the occupants of Demery consistently returned larger segments of the bones, as well as more of them. At Paul Brave and Huff the articulating ends of the humerus, radius, and ulna were represented by little more than the articulating surface, but at Demery a respectable part of the shaft remained intact. A plausible reason for this is that the occupants of Demery did not shatter the bones as thoroughly as did those of Paul Brave and Huff in the preparation of bone grease.

Pelvis.—The very low frequency of the pelvis in each site suggests that it was normally left at the kill site. Pelves, when they do occur, consist largely of the acetabulum and the immediately contiguous bone; it is likely that this part of the pelvis was carried to the village still attached to the hind limb.

Hind limb.—The frequency distribution of the elements of the hind limb closely approximates that of the forelimb, although fewer femora were returned than humeri. The maximum number of individuals represented and the corresponding percent of greatest number for each site is nearly the same. As was the case in the forelimb, fragments of the bones of the hind limb were notably larger at Demery than they were at Paul Brave and Huff.

Phalanges.—The frequencies for phalanges are fairly close for Paul Brave and Huff, but Demery shows a much greater number of these

elements than either one of them. These elements were used for soup and glue. A similar situation was seen to obtain in the elements of the forelimb and hind limb. The first phalanx is least common in each site, for they were uniformly split or broken; they were only rarely intact, for the first phalanx was the point of detachment for the feet. The second phalanx was usually intact, as well as the third phalanx. The number of second phalanges is greatest in each case, likely owing to the breakage of the first phalanx and to deterioration of the third phalanx in the soil.

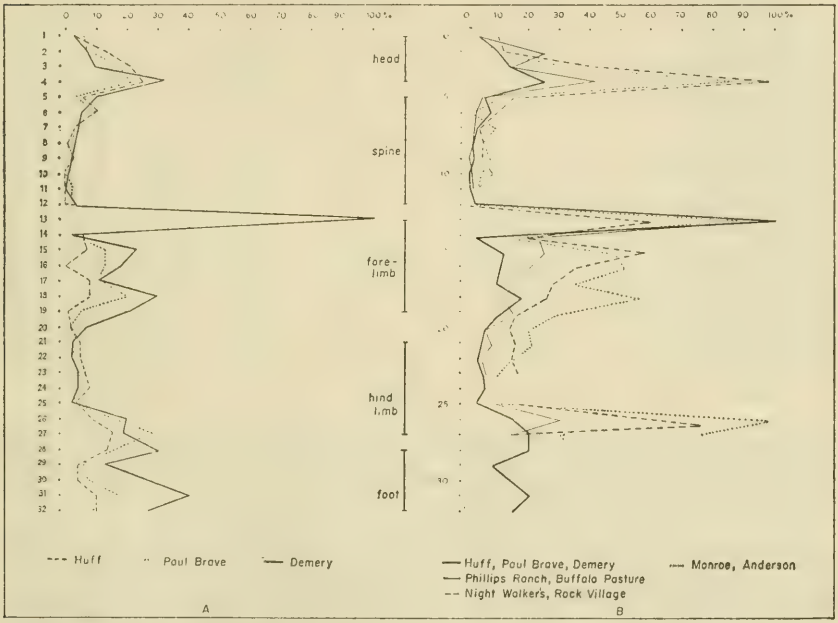

FIGURE 17.—Frequencies of bison bone at various sites. *a*, Frequencies of bison bones at Paul Brave, Huff, and Demery Sites. *b*, Modal frequencies of bison bones in four groups of sites.

A graphic presentation of the data in table 1 (see fig. 17) yields very similar curves of distribution for each of the three sites—a similarity of pattern which approached identity. Except for the relatively greater return to the site of a number of elements, Demery shares with Paul Brave and Huff exceedingly similar butchering habits. The mode of the frequencies of these three sites is plotted in figure 17, *b*, in which the modes of the frequencies from a number of other village sites and components on the Missouri River have also been plotted. Theodore White has analyzed and tabulated the data on bison bone from the Anderson and Monroe components at the Dodd Site, 39ST30 (1953, table 6; 1954, table 12); the Phillips Ranch and Buffalo

TABLE 1.—*Frequencies of the bison bone from Paul Brave, Huff, and Demery Sites*

	Number of individuals represented			Percentage of greatest number		
	Paul Brave	Huff	Demery	Paul Brave	Huff	Demery
1. Skull, occiput	3	3	3	5.7	3.4	3.2
2. Skull, horn cores	4	13	7	7.5	14.8	7.4
3. Skull, maxilla	9	19	9	17	21.6	9.5
4. Mandible	11	22	30	20.5	25	31.6
5. Vertebra, atlas	2	4	9	3.8	4.5	9.5
6. Vertebra, axis	5	9	5	9.4	10.2	5.3
7. Vertebra, cervical	2	3	4	3.8	3.4	4.2
8. Vertebra, dorsal	1	1	3	2	1	3.2
9. Vertebra, lumbar	1	2	2	2	2.3	2
10. Vertebra, sacral			1			1
11. Vertebra, caudal	1			2		
12. Dorsal spines	1		3	2		3.2
13. Scapula	53	88	95	100	100	100
14. Humerus, proximal	1	5	2	2	5.7	2
15. Humerus, distal	7	6	21	13.2	6.8	23.2
16. Radius, proximal	7		18	13.2		19
17. Radius, distal	6	7	11	11.3	8	11.6
18. Ulna, proximal	11	7	28	20.5	8	29.5
19. Metacarpal, proximal	3	1	20	5.7	1	21
20. Pelvis	1	2	7	2	2.3	7.4
21. Femur, head	2	4	3	3.8	4.5	3.2
22. Femur, proximal	1	4	2	2	4.5	2
23. Femur, distal	2	5	4	3.8	5.7	4.2
24. Patella	3	7	4	5.7	8	4.2
25. Tibia, proximal	1	3	2	2	3.4	2
26. Tibia, distal	8	7	19	15	8	20
27. Astragalus	15	13	18	28.3	14.8	18.9
28. Calcaneum	8	12	28	15	13.6	29.5
29. Metatarsal, proximal	3	4	12	5.7	4.5	12.6
30. 1st phalanx	4	4	25	7.5	4.5	26.3
31. 2d phalanx	9	9	38	17	10.2	40
32. 3d phalanx	5	9	26	9.4	10.2	27.4

Pasture Sites, 39ST14 and 39ST6 (1954, table 11); and Rock Village and Night Walker's Butte in the Bull Pasture, 32ME15 and 32ML39 (1954, table 12; 1955, table 12).

On the basis of his interpretations of the data from these sites, White (1954, p. 259) concluded that "the frequency distribution of the bison bone from the Phillips Ranch and Buffalo Pasture Sites describes essentially the same pattern," and that (p. 262) "the over-all pattern of the frequency distribution of the skeletal elements is essentially the same for the Monroe and Anderson components and Rock Village and is interpreted to indicate culturally related peoples." Accordingly, the mode of the Phillips Ranch and Buffalo Pasture Sites and of the Monroe and Anderson components was plotted for figure 17, *b*. Since the frequency distributions of the bone from Rock Village and Night Walker's Butte also resemble one another closely, they were similarly plotted together in figure 17, *b*.

The similarities and differences between the four groups of sites may best be illustrated by reference to the table. Two obvious differences are immediately apparent: (1) The percentage of bones returned from the hunt is significantly higher for Monroe-Anderson and Rock Village-Night Walker's Butte, and (2) the mandible and distal tibia are the most common elements for Monroe-Anderson and Rock

Village-Night Walker's Butte, as opposed to the scapula for the other sites. In brief, there are two distinct patterns of distribution in the nine sites which reflect rather consistent habits of butchering practice. It is obvious that Paul Brave, Huff, and Demery most closely approximate the distributions of Phillips Ranch and Buffalo Pasture.

The results of this comparison directly contravened the a priori assumption with which the comparison began, i.e., that Demery would most nearly correspond to Phillips Ranch and Buffalo Pasture, and that Paul Brave and Huff would approach the distribution of the Monroe and Anderson components and Night Walker's Butte. If the comparisons in figure 17, *b*, are valid, they suggest that Mandan butchering techniques (as seen at Paul Brave and Huff) are nearer the Arikara techniques (as reflected in Phillips Ranch and Buffalo Pasture) than they are to Hidatsa (as seen in Rock Village and Night Walker's Butte). More simply stated, the Mandan and Arikara would seem to have shared a number of butchering habits that were not shared with the Hidatsa, when we might have anticipated that Mandan and Hidatsa would be different, if not distinct, from the Arikara.

This hypothesis requires a great deal of further checking, particularly using data from many more sites and from more soundly documented sites. If the two broad types of butchering habits are shown to be mutually exclusive as additional data accumulate, added insight will be provided for the study of the development of the groups resident in the Northern Plains from late prehistoric to historic times. It is of course possible that these two "types" may be shown to simply represent the poles of a continuum, but the possibility of seriating such interrelated data might offer even greater results than would the comparison of two distinct, if related, phenomena.

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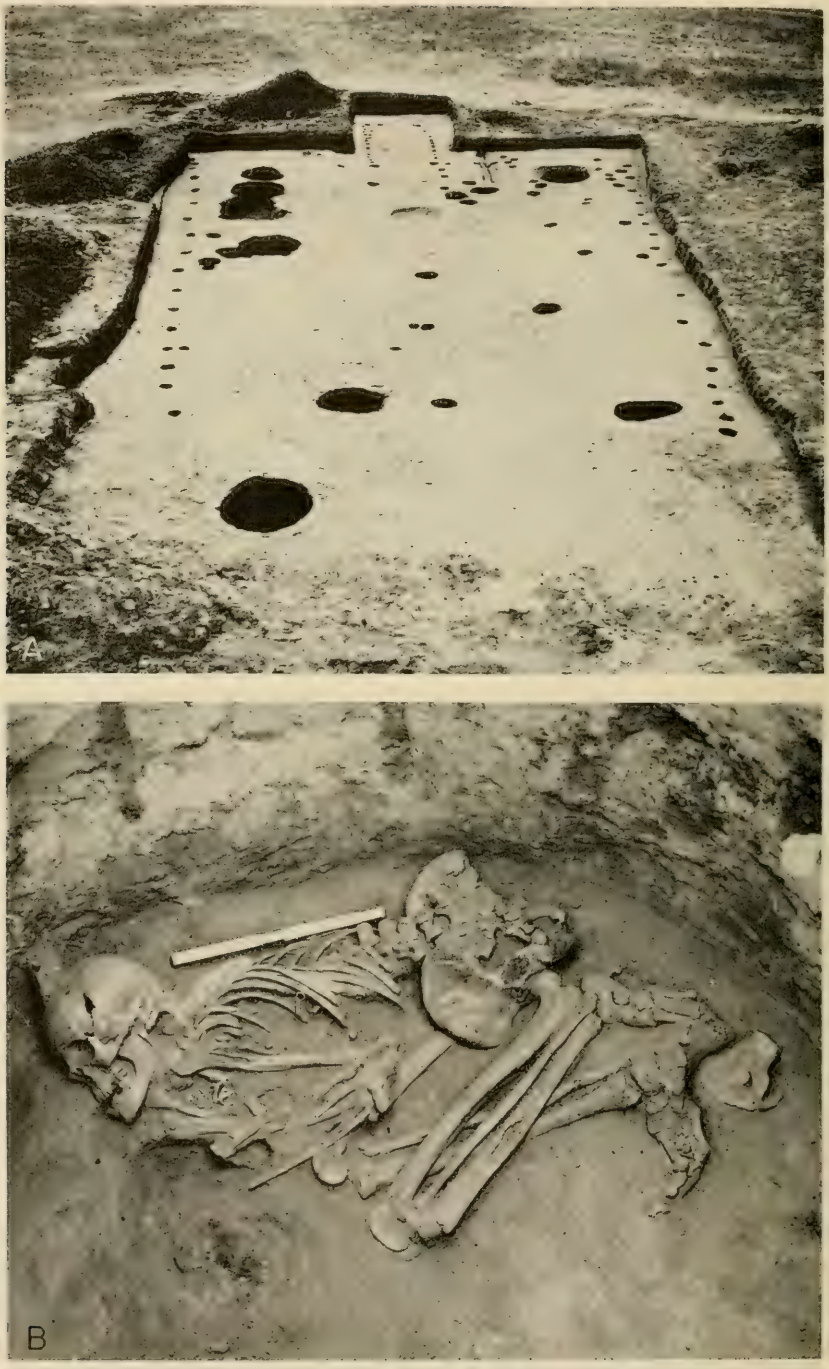
Huff Site; oblique and vertical aerial photographs. *a*, Low oblique view of Huff, view to the northeast (photograph by Russell Reid). *b*, Vertical aerial photograph of Huff from an altitude of about 1000 feet (photograph by the North Dakota National Guard).

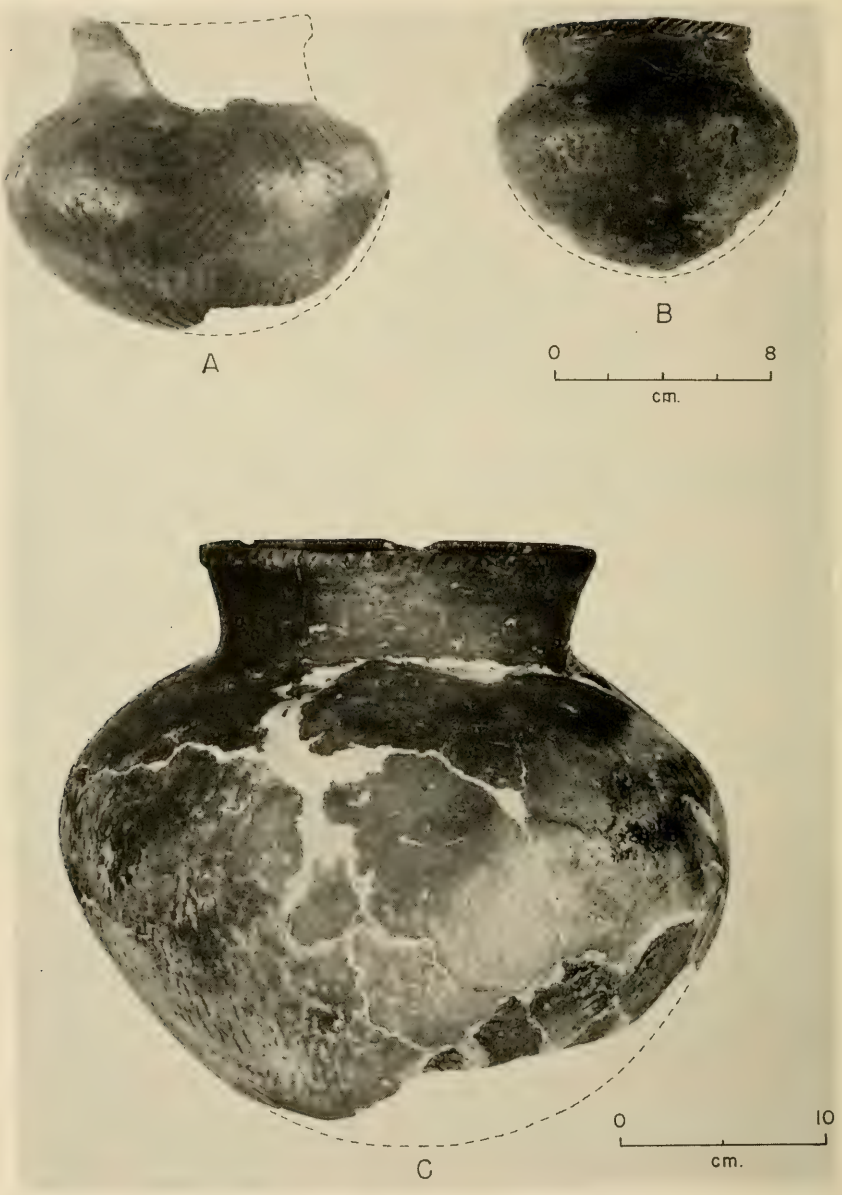
Huff Site; northwest bastion and east section. *a*, The northwest fortification ditch, with Bastion I in the foreground. *b*, High oblique view of the east part of the site.

Houses 3 and 12. *a*, House 12, view to the northeast. *b*, House 3, view to the southwest.

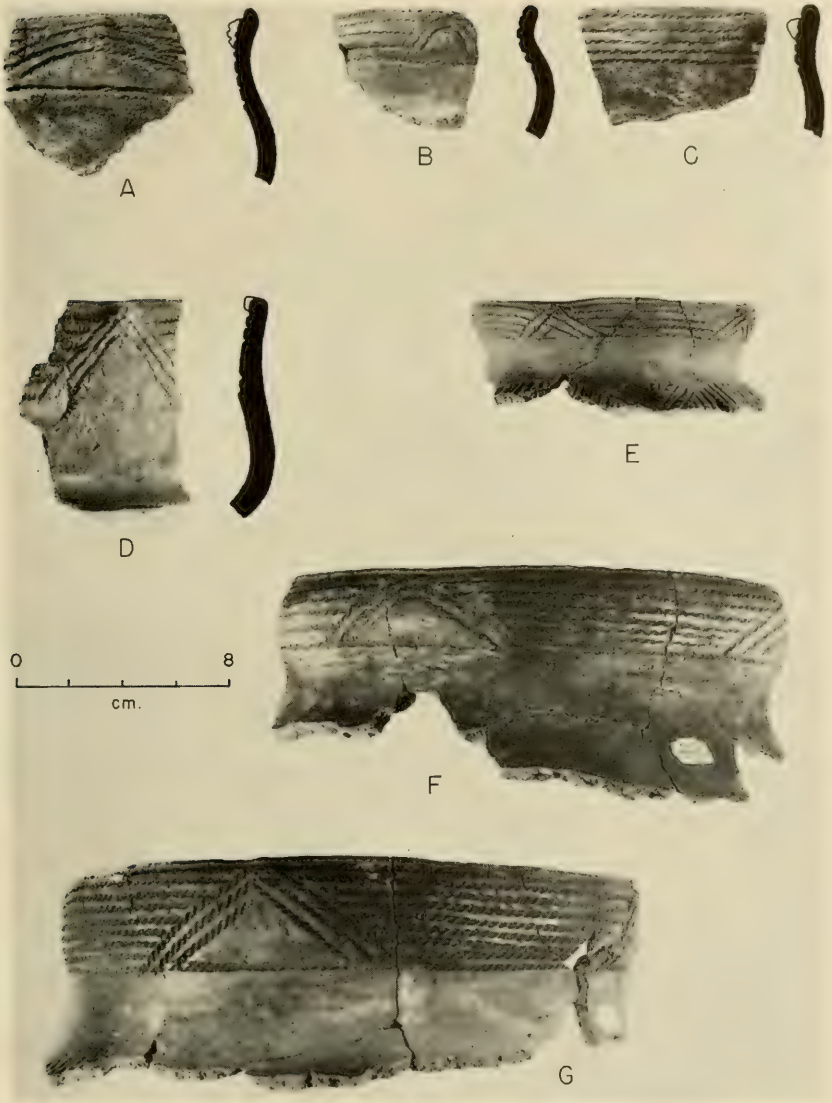


Houses 6 and 8, including burial 1. *a*, House 6, view to the southwest. *b*, Burial 1, in Feature 143, House 8 (adult female).

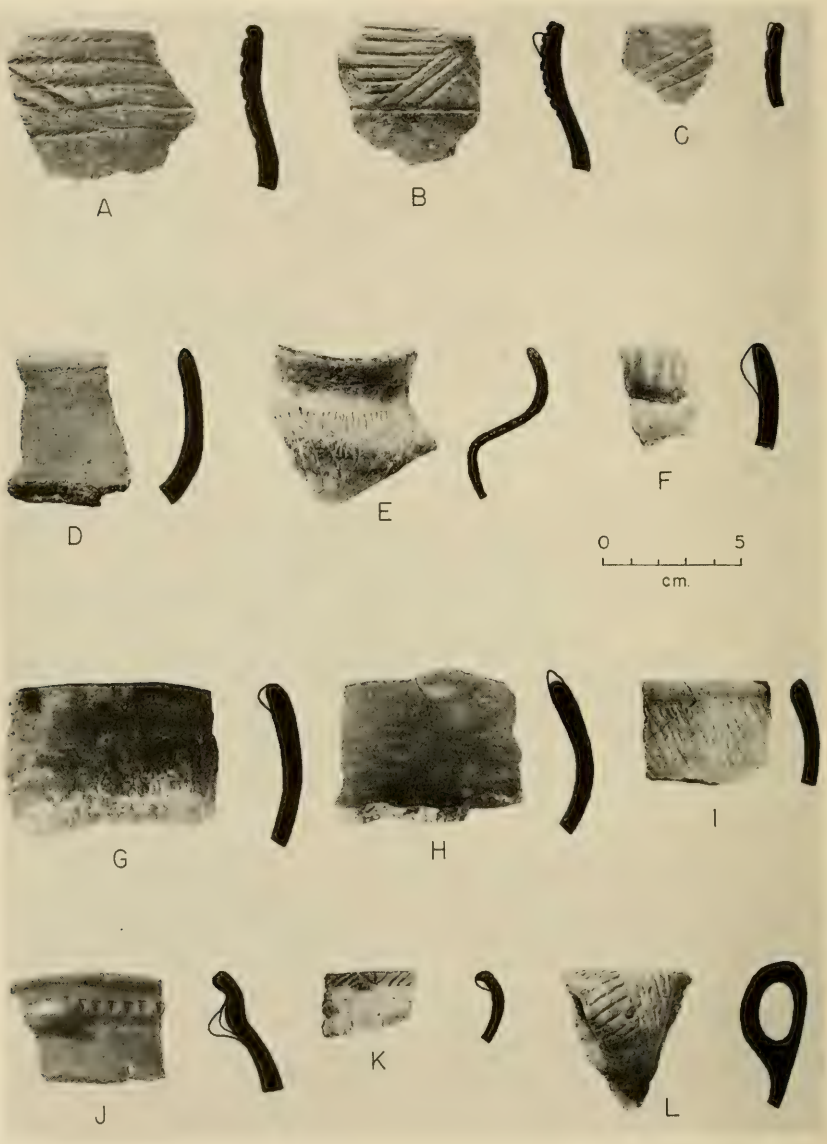
Features from Houses 6, 7, and 8. *a*, Panorama of Houses 6–8, view to the southeast. *b*, Removing an entrance post in House 7. *c*, Charred coil of vegetal figers, Feature 198, on floor of House 7. The scale is in inches.



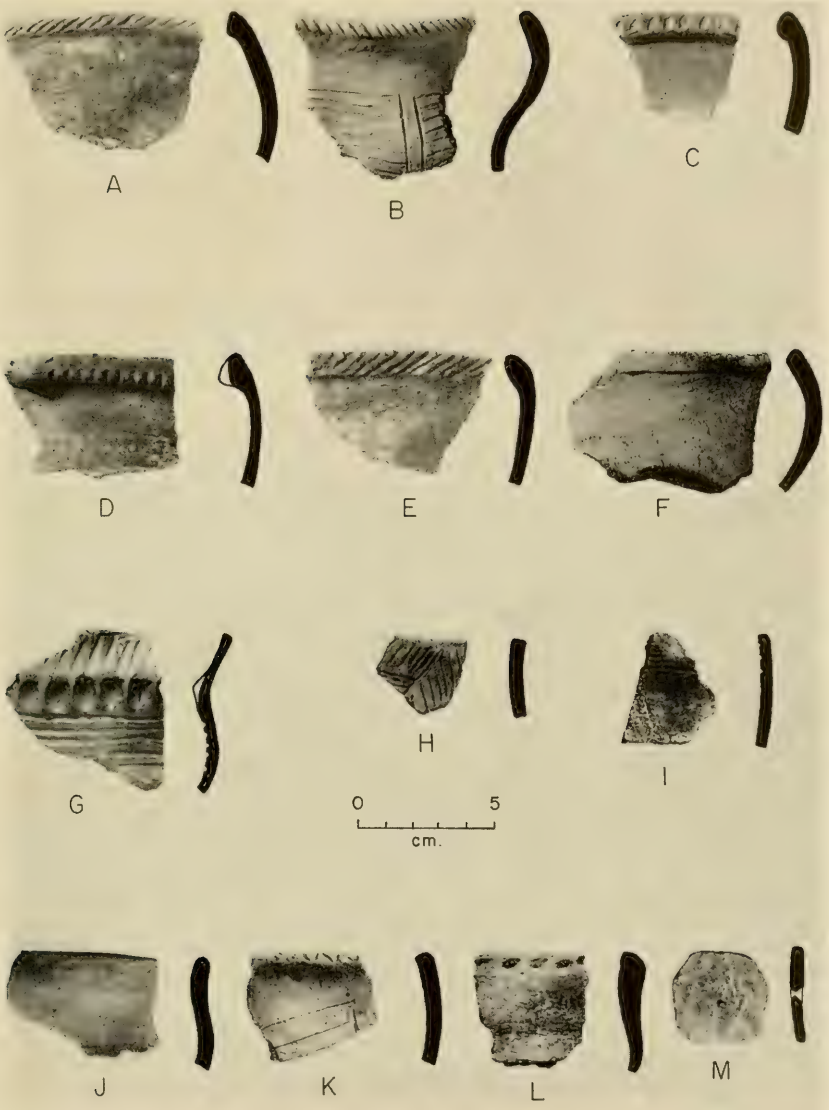
Restored Stanley Tool Impressed vessels.



Fort Yates Cord Impressed rim sherds.



Rim sherds. *a–c*, Fort Yates Incised. *d*, *i*, Stanley Plain. *e*, Riggs Decorated Lip. *f*, *k*, Stanley Tool Impressed. *g*, *h*, Riggs Plain. *j*, Riggs Filleted Rim. *l*, Atypical, incised strap handle.



Rim sherds. *a*, *c–e*, Stanley Tool Impressed. *b*, Riggs Decorated Lip. *f*, Stanley Plain. *g*, Example *A*. *h*, Fort Yates Incised. *i*, Example *B*. *j*, Fort Yates Plain. *k*, Example *C*. *l*, Example *D*. *m*, Pierced pottery disk.

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